PWD

1894

PROCEEDINGS

OF THE

MADRAS GOVERNMENT

IN THE

PUBLIC WORKS DEPARTMENT,

IRRIGATION BRANCH,

FOR THE

MONTH OF JULY 1894.

Printed by Authority.

MADRAS:
PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS.

1894.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

G.O., dated 15th June 1894, Mis. No. 2338, Revenue.

Read—the following paper :—

Proceedings of the Board of Revenue (Revenue Settlement, Land Records and Agriculture), dated 2nd June 1894, Mis. No. 3321.

Read—letter from the Chief Engineer for Irrigation, dated 8th May 1894, No. 241 M.

ABSTRACT.—Requesting that the amounts (including the usual percentage charges for establishment, &c.) proposed to be allotted against the demands for works in the statement may be placed from the current year's grant for Minor Irrigation Works, Revenue Department, at the disposal of his department to admit of early arrangement being made for the execution of works.

Read—endorsement from the Chief Engineer for Irrigation, dated 16th May 1894, No. 264 M., forwarding the following letter from the Superintending Engineer, III Circle, dated 5th May 1894, No. 304, to the Secretary to the Board of Revenue, Revenue Settlement, Land Records and Agriculture, in continuation of his office letter No. 241 M., dated 8th May 1894 :—

In continuation of this office No. 135, dated 14th April 1894, I have the honour to state that a sum of Rs. 6,800 may be required for the Cuddapah division for outlay on "Minor Works, Revenue Department," during 1894–95.

Resolution—dated 2nd June 1894, Mis. No. 3321.

In the above papers, the Chief Engineer for Irrigation reports the amounts proposed to be allotted to each district for expenditure on Minor Irrigation Works in charge of the Revenue Department which may have to be repaired by the Public Works Department officers during the current official year, and requests that a sum of Rs. 67,418 may be placed at the disposal of the Public Works Department for the purpose. The list of works contained in the first paper read above comprises many items which have not yet been sanctioned by the Board for execution in 1894–95, and the large sum of Rs. 15,000 is proposed to be spent during the year on two works in the Tinnevelly district which are estimated to cost Rs. 40,000, but of the necessity of meeting the outlay on which from the maintenance grant allowed to the Revenue Department, the Board has at present no information. The Collectors of the districts concerned will accordingly be requested to submit as early as possible applications for allotments in the usual form for such works as may have to be undertaken by the Public Works Department during the current year.

2. In the meantime the Board requests that the Government will be pleased to sanction the transfer to the Public Works Department of a sum of Rs. 50,000 from the grant for "the maintenance and upkeep of Minor Irrigation Works" sanctioned in G.O., No. 1237, dated 6th December 1893, Financial, communicated with G.O., No. 4502, dated 22nd December 1893, Revenue. This amount may be distributed by the Chief Engineer according to the requirements of each district in respect of funds for the execution of sanctioned works.

(A true Copy and Extract.)

(Signed) P. RAJARATNA MUDALIAR,
Secretary.

Order—15th June 1894, Mis. No. 2338, Revenue.

The Board's recommendation in paragraph 2 of its Proceedings read above is approved and sanctioned. The Financial Department will be requested to instruct the Accountant-General to place the sum of Rs. 50,000 at the disposal of the Public Works Department.

(True Extract.)

(Signed) E. GIBSON,
Ag. Secretary to Government.

ORDER—dated 3rd July 1894, No. 504 I., Public Works.

Communicated to all Superintending Engineers who will report, at an early date, to the Chief Engineer for Irrigation the amounts required to be allotted for *sanctioned* works in each division under Original Works and Repairs from the sum now assigned to meet expenditure during the current year on "Minor Works, Revenue Department," to be executed by Public Works Department officers.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To all Superintending Engineers.
,, the Chief Engineer for Irrigation.
,, the Examiner, Public Works Accounts.
,, the Revenue Department.

IRRIGATION.
ACCOUNT.

Govt of {1894} Madras.

PUBLIC WORKS.

Dated July, 3rd.

Recd. *Encl.*

G.O., 3rd July 1894, No. 504 I.

JULY.

Minor Irrigation Works

Proceedings, Revenue Department, sanctioning a transfer to the Public Works Department of Rs. 50,000 from the grant for the maintenance and upkeep of —, communicated to Superintending Engineers for report on the requirements for sanctioned works in each division.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated Bezwada, 7th June 1894, No. 494 K.S.

I have the honour to forward, for your approval and sanction of Government, an estimate of Rs. 69,800 for making a straight cut on Répalle main drain in the Kistna Western division.

2. The cost of the work can be met from the provision of Rs. 15,000 and Rs. 65,692 as per items 686 and 687 in the statement printed in G.O., dated 11th October 1893, No. 857 I.

3. It is expected that the proposed straight cut will prevent the destruction of crops or permit of waste land being irrigated over 6,500 acres and materially improve the drainage of an additional 7,000 or 8,000 acres. It should be noted as a reason for not attempting to improve the existing line of the drain that the waterway of the Pudivada bridge has been proved to be insufficient.

4. The report attached to the estimate explains the necessity for the work and I would recommend it for sanction.

ENCLOSURES.

REPORT to accompany estimate for constructing an iron aqueduct to carry the Vellatur channel over the proposed straight cut on Répalle main drain near Razole.

The hydraulic details relating to the Vellatur channel and the aqueduct are noted on the plan.

The old Vellatur channel is run at a very low level. It was formerly a river inundation channel and when the Vellatur block is taken up and the irrigation arrangements improved the Vellatur channel will have to be realigned and taken in a higher level. The aqueduct is therefore not placed on the existing line of the Vellatur channel. The aqueduct will consist of an iron trough 4′ × 3′ 5¾″ interior dimensions carried on masonry piers and abutments founded on wells.

The total length of the trough will be 70 feet made up of—

	FEET.
Three spans of 20 feet each	60
Two piers of 2½ feet each	5
Two end lengths of 2½ feet each on abutments	5
Total ...	70

For calculating the discharge an additional length of 5 feet has been allowed on each side for the contraction of the wing walls.

The levels relating to Vellatur channel and aqueduct may have to be slightly altered and depend on the investigation for irrigating this block which is now in progress. The error will not, it is believed, be more than 6 inches and the levels noted are probably rather too low than too high. The Vellatur channel banks will have a top width of 2½ feet. At the end of each wing wall the top of these banks will be widened out to 4½ feet and ramps with a slope of 1 in 6 will be provided from top of bank down to ground level.

The outside slope of the ramps will be revetted. The top of the wing walls will be corbelled out as shown to a width of 4¼ feet at a level of 14·00 so as to form a riding path and will lead on to a platform of beam stones placed across the wing walls at the end of the iron trough. The roadway on the iron trough will be formed of planks 2″ thick and 5 feet in length laid on the trough and spaced ½″ apart. The difference in level between top of planking (13·10) and top of wing wall (14·00) will be overcome by the planking being laid on special angle iron supports

(see detail drawing) at a slope of 1 in 6 at each end of the trough. The pathway will be protected by fixing hand rails of 1″ gass piping $2\frac{1}{2}'$ high supported by angle iron uprights $2'' \times 2'' \times \frac{1}{4}''$.

The trough will consist of $\frac{1}{4}''$ wrought iron plates at bottom and sides with inside angle irons $2\frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{1}{4}''$ at top and bottom of each side and a T iron $3'' \times 2'' \times \frac{1}{4}''$ laid along the centre of the bottom of the trough inside.

The extreme ends of trough will be stiffened by an angle iron $3'' \times 3'' \times \frac{3}{8}''$ placed all round the trough and intermediate stiffeners of T iron $3'' \times 2'' \times \frac{1}{4}''$ will be placed all round the trough at intervals as shown on plan.

The hand rail uprights will be rivetted to these stiffeners and the planking will be rivetted to the upper angle irons inside the trough by $\frac{3}{8}''$ rivets—2 rivets to each plank. To keep the planking firm a continuous strip of $2'' \times \frac{1}{4}''$ iron will be placed over the planking on each side. This strip of $\frac{1}{4}''$ iron will also act as an upper washer for the plank rivets

The trough will rest on a $\frac{1}{4}''$ sheet of lead laid on teak bearing plates on the piers and abutments.

The bearing plates will be bolted down by two 1″ holding down bolts (squared at their heads where they pass through the anchor plates) on each pier and will be held back by two flat iron bars $2\frac{1}{2}'' \times \frac{1}{2}''$ on each abutment.

All bottom rivets coming over the abutments or piers and for 3″ on each side of them will have their lower heads counter-sunk so as to be flush with bottom of trough. To prevent leakage at ends of trough the $3'' \times 3'' \times \frac{3}{8}''$ angle irons will fit into grooves ($6'' \times 4''$) left in the masonry at bottom and sides. These grooves will be filled with a mixture of coir and dammer well rammed in which will check all leakage and at the same time yield slightly so as to allow for contraction and expansion of the trough.

To allow for scouring or future deepening of the bed of the drain, the rough stone apron, which will be 24 feet wide, will be laid at 2 feet below correct bed level. The abutments will be protected by revetting the slopes for a length of 30 feet on each side. The revetment will rest on a small dry rough stone footing wall.

A piece of angle iron $2\frac{1}{2}'' \times 2\frac{1}{2}'' \times \frac{1}{4}''$ and $2\frac{1}{2}$ feet in length will be bolted down to the bearing plates on the piers on the down-stream side of the trough with a clearance of $\frac{1}{2}''$ to prevent the trough being shifted or displaced in the event of an abnormal flood coming down the drain.

(Signed) A. A. G. MALET,
23rd April 1894. Ex. Engr., Kistna Western Division

REPORT to accompany estimate for excavating a straight cut on Répalle main drain from 19 miles to salt creek.

This estimate has been prepared under the instructions contained in Superintending Engineer's No. 2689 K.S., dated 4th February 1893.

From the enclosed sketch it will be seen that the existing line of the Répalle main drain below Razole at $19\frac{1}{2}$ miles is extremely tortuous, the total length to the salt creek being about 12 miles as compared with a length of about 6 miles in the proposed straight cut.

From Gudavalli to about a mile below Razole the drain runs in a fairly deep cutting which is apparently artificial. Below Razole it bends abruptly to the west and follows an extremely tortuous course through naturally low ground. Near the junction of the Nallavada affluent there is a short length of cutting and from Pudivada to the salt creek it again runs in a deep artificial cut. The drain appears to have silted up considerably below Razole, and owing to its extended course, the silting up of the bed and narrow cutting at Gudavalli, Nallavada affluent and Pudivada, the flood waters never did and do not run off freely and a very large area of low land on both sides of the drain extending from Gudavalli ($17\frac{1}{2}$ miles) to near Peravalli ($12\frac{1}{2}$ miles) is swamped from September to November every year and rendered almost useless for purposes of cultivation. From Gudavalli bridge down, the drain was originally excavated to a bottom width of 65 feet. In high floods there is no head at all at Gudavalli bridge which has 4 spans of 30 feet each, but there is a head of 0·63 foot at Pudivada bridge * at $27\frac{3}{4}$ miles; this is accounted for by the fact that the drain from Pudivada bridge to the salt creek has been scoured out at the sides and widened. Levels show that the slope of the country and natural line of drainage for water coming down the Répalle main drain to Razole is towards Pamidimarru on the Bhattiprole drain *via* Dhulipudi. This line has been selected for the straight cut now proposed, as a free flow down the Bhattiprole drain is obstructed by the Iskapalle channel aqueduct and most of the flood water would have to find its way back to the existing exit of the Répalle main drain *viâ* the Nagaram drain.

* Of 5 spans of 25 feet each.

It is therefore proposed to make a straight cut from about 1 mile below Gudavalli bridge to the nearest point of the salt creek.

This line will cut across the Vellatur channel. There are some 2,000 acres of wet land with a probable extension up to 4,000 acres under the Vellatur channel beyond the straight cut, so an

aqueduct has been provided for in the estimate. The drain in its upper course has a continuous bank on its right or west side; this bank will be continued to the point where the straight cut commences.

At the point where the straight cut takes off, the old course of the drain will be blocked by a strong bank and the spoil from the straight cut will be placed so as to form a continuous bank on the left or east side.

The section of the straight cut has been designed on the principle usually adopted for drains in this delta

The drainage being assumed to run off in 6 days and one-third of this result is taken as the tentative discharge.

The catchment area is 130 square miles.

Required D = $450 \times 130^{\frac{2}{3}}$ = 11,547 cubic feet per second.

Tentative discharge = $11{,}547 \times \frac{1}{6 \times 3}$ = 640 cubic feet per second.

Bottom width, 32 feet.

Side slopes, 3 to 1.

Depth of water, 6 feet.

Fall, 1 foot per mile.

V = 2·19 feet per second.

Calculated D = 657 cubic feet per second.

Slopes of 3 to 1 have been allowed as the soil is sandy. The action at the Pudivada cut close by shows that a gentle slope is required.

The estimate amounts to Rs. 69,800 and is recommended for sanction from the following provisions in the statement printed with G.O., No. 857 I., dated 11th October 1893 :—

	RS.
Item 686	15,000
„ 687	65,692
Total ...	80,692

Item No. 686 is no longer required as it was provided in view of another line being selected for the straight cut now proposed.

Out of the total of Rs. 69,800, a sum of Rs. 12,400 has been provided as compensation for land. There is no doubt that a large saving will be effected on this item by granting land in exchange instead of paying money compensation.

ESTIMATE FORM—Abstract—Classified.

Sub-head.	Names of works.	Amount of estimate for individual work.	Total of sub-heads.	Total for each canal or distributary.	Total of each main head.	Remarks.
1	2	3	4	5	6	7
	CAPITAL EXPENDITURE NOT CHARGED TO REVENUE.	RS.	RS.	RS.	RS.	
	49. *Irrigation.*					
	Kistna Delta System.					
	Western Section.					
	I. Works.					
	4. Drainage and Protective Works.					
	Proposed straight cut on Repalle Main Drain.					
2. Land ..	1. Compensation for land	12,400	12,400			
3. Works ..	2. Aqueduct at 2 miles 37 chains	11,300	11,300			
4. Earthwork ..	3. Excavating straight cut	39,760	39,760			
5. Miscellaneous.	4. Three cattle crossings	6,000				
	5. Fixing B.M. and demarcation stones ..	340	6,340			
				69,800	69,800	

1st May 1894.

(Signed) A. A. G. MALET,
Ex. Engr., Kistna Western Division.

No. 83 I.

Submitted to Government with a recommendation that the estimate forwarded by the Superintending Engineer, II Circle, be sanctioned. The proposed outlay may be met as shown below from the provision made for further expenditure on items 686 and 687 of the classified abstract estimate printed in Proceedings of the Madras Government, No. 857 I., dated 11th October 1893 :—

		RS.
Item 686	... ...	15,000
" 687	... ...	54,800
	Total ...	69,800

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

27th June 1894.

ORDER—dated 4th July 1894, No. 507 I., Public Works.

The estimate, amounting to Rs. 69,800, for making a straight cut on Répalle main drain, Kistna Western division, is sanctioned from the source indicated in the foregoing endorsement of the Chief Engineer for Irrigation.

2. This sanction is registered as No. 48 I. of 1894–95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle, with enclosures.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 4th.

Recd. *Encl.*

G.O., 4th July 1894, No. 507 I.

JULY.

Repalle Main Drain

Estimate of Rs. 69,800 for making a straight cut on —, Kistna Western division, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper:—

From G. D. WYBROW, Esq., Superintending Engineer, I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 19th May 1894, No. 411 G.D.

It has been brought to my notice by Mr. Lewis, Executive Engineer, Coimbatore Division, that paragraph 2 of my letter No. 2524 G.D. of 16th January 1894, printed with G.O., No. 256 I., dated 19th March 1894, cast some reflection on the character of the work in connection with the Allaram aqueduct, the alterations to which were carried out by Mr. Lewis when in charge of the Gódávari Central Delta division. I have the honour to state that my letter was written on a report furnished by the Executive Engineer (Mr. Joyce), Western division.

2. On since inspecting the work, I may be allowed to mention, in justice to Mr. Lewis, that the extension of the work carried out by Mr. Lewis is intact, but that the portion of the work which collapsed was the original old work.

No. 84 I.

Submitted to Government.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

29th June 1894.

Order—dated 4th July 1894, No. 509 I., Public Works.

Recorded.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, I Circle.
,, Executive Engineer, Coimbatore Division,
through the Superintending Engineer, IV Circle.
,, Examiner, Public Works Accounts.
,, Revenue Department.
Editors' Table.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 4th.

Recd. *Encl.*

G.O., 4th July 1894, No. 509 I.

JULY.

Allaram Aqueduct

Letter from Superintending Engineer, I Circle, stating that the work carried out by Mr. Lewis in connection with the — when he was in charge of the Gódávari Central Delta division is intact, recorded.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

Telegram from the Secretary to the Government of India, Public Works Department, to the Joint Secretary to the Government of Madras, Public Works Department, Irrigation Branch, dated Simla, 27th June 1894, No. 66 A.I.

Your telegram of 16th instant. Regret no funds available. If money urgently required for Kistna delta, it must be reappropriated within existing grant 49.

ORDER—dated 7th July 1894, No. 510 I., Public Works.

Communicated to the Superintending Engineer, II Circle, for information and guidance, with reference to G.O., No. 452 I., dated 16th June 1894.

2. As the additional amount required for the Kistna delta system cannot be provided by reappropriation from the grants for other works, the Superintending Engineer, II Circle, will arrange for the expenditure during the current year being restricted to the existing grant for the delta.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
,, Superintending Engineer, II Circle.
,, Examiner, Public Works Accounts.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 7th.

Recd. *Encl.*

G.O., 7th July 1894, No. 510 I.

JULY.

Kistna Delta

Telegram from the Government of India stating that no funds are available for works on the — and that, if urgently required, funds should be provided by reappropriation from existing grant, communicated to Superintending Engineer, II Circle, with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated 20th June 1894, No. 101 B.C.

I have the honour to forward herewith, for your approval and sanction of Government, an estimate, amounting to Rs. 1,900, for demarcating lands with granite stones embedded in concrete in miles 1/III to 89 of the Northern canal of Buckingham canal from the balance available for unforeseen works of the canal.

2. The report which accompanies the estimate explains the necessity for the work.

Enclosure.

Report to accompany estimate for completion of demarcation of lands belonging to Buckingham canal, Northern canal.

	RS.
Amount of estimate	1,900

In G.O., No. 173 I., dated 20th February 1892, an estimate of Rs. 2,950 was sanctioned for demarcation of canal in Northern canal from miles 90 to 195, portions of Northern canal from miles 0 to 90, which were then in execution, or for which the boundaries were undetermined, being left (in order to save delay) to be subsequently demarcated, the determination of boundaries over such a length of canal being found to take up a long time.

2. In G.O., No. 34 I., dated 14th January 1893, an estimate of Rs. 1,200 was sanctioned for fully demarcating all canal lands in Southern canal.

3. The estimate now submitted for sanction provides for completion of demarcation of Northern canal, viz., for demarcation of portions from miles 0 to 90, as detailed in estimate not yet demarcated.

4. The demarcation stones will be of granite embedded in concrete, the dimensions being as shown in sketch accompanying, which provides for fixing stones similar to those already sanctioned in the Government orders above quoted, and is in accordance with description 2 (a) of circular memo. No. 21 G., dated 17th April 1894, by Chief Engineer for Irrigation.

Madras,
6th June 1894.

(Signed) A. S. RUSSELL,
Ex. Engr., Buckingham Canal.

ORDER—dated 7th July 1894, No. 513 I., Public Works.

The following estimate is sanctioned from the balance of the amount reserved for unforeseen works of the Buckingham canal, which will then be reduced to Rs. 99,475 :—

Irrigation.
43. Minor Works and Navigation.
Minor Works for which Capital and Revenue Accounts are kept.
Capital Account.
Buckingham Canal.
Northern portion.
I. Works.
2. Main Canals and Branches.
15. Miscellaneous.

	RS.
Demarcating canal lands in miles 1/III to 89, estimate	1,900

2. This sanction is registered as No. 49 I. of 1894-95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle, with three enclosures.
" Examiner of Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 7th.

Recd. *Encl.*

G.O., 7th July 1894, No. 513 I.

JULY.

Buckingham Canal

Estimate of Rs. 1,900 for demarcating canal lands in miles 1/III to 89 of the northern portion, —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

G.O., dated 27th June 1894, No. 499, Financial.

Read—G.O., dated 15th June 1894, No. 2338, Revenue.

Order—dated 27th June 1894, No. 499, Financial.

The Accountant-General is authorised to place the sum of Rs. 50,000 (fifty thousand) at the disposal of the Public Works Department by transfer from the grant sanctioned for the Civil department under 43. *Minor* Works and Navigation.

(True Extract.)

(Signed) J. F. PRICE,
Chief Secretary.

ORDER—dated 10th July 1894, No. 519 I., Public Works.

Communicated to the officers concerned for information in continuation of G.O., dated 3rd July 1894, No. 504 I.

2. The sum of Rs. 50,000 will be treated as an addition to the current year's grant for expenditure in the Public Works Department under "Provincial 43. Minor Works and Navigation" and will be distributed as shown below :—

Minor Works, Revenue Department.
Reserve.

	RS.
Original works	40,161
Establishment	9,237
Tools and plant	602
Total ...	50,000

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" all Superintending Engineers.
" the Examiner, Public Works Accounts.
" the Revenue Department.
" the Financial "

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 10th.

Recd. *Encl.*

G.O., 10th July 1894, No. 519 I.

JULY.

Minor Irrigation Works

Proceedings, Financial Department, authorising the Accountant-General to place Rs. 50,000 at the disposal of the Public Works Department for — to be executed by that department, communicated to the officers concerned with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

From J. C. LARMINIE, Esq., Superintending Engineer, V Circle, to the Chief Engineer for Irrigation, dated Chepâk, 18th January 1894, No. 9 E.I.

In continuation of the various detached reports submitted from time to time regarding damages to irrigation works during the heavy rains of November last, I now have the honour to forward a general descriptive summary of the damage sustained by each division in the circle.

2. Commencing with Chingleput which, as might be expected, from its position with reference to the cyclone of the 6th November, then, sustained some damage.

3. On the morning 6th November—

		INCHES.
Rainfall gauged at Madras was	... ...	6·3
Do.	at Chembrambakam tank, 12 miles from the coast ...	8
Do.	at Red Hills (8 miles from the coast, 17 miles north-east of Chembrambakam)	8·60
Do.	at Cholavaram (4 miles further north)	9·55
Do.	at Tamarapak anicut (20 miles from the coast) ...	12·10

4. So, as far as available observations indicate, the centre of the cyclone must have passed over the valley of the Kortilliar. At the Tamarapak anicut a maximum depth of 7·10 feet * passed over on the 7th, causing considerable damage to the cut stone floor, as already reported in detail in my inspection notes of 22nd November.

* M.F.L. of 1884 14·5 feet.

Lower down the river the flood banks between the Nellore road and the Vallur anicut have suffered severely.

Ten and a half feet of water passed over the latter anicut against 10·3 in 1884.

While the left bank below was breached to a length of 416 feet, and still further down along the island the bank breached in three places.

5. To the north of the Kortilliar and nearly parallel thereto flows the Arani river, the flood banks of which have also suffered severely, the right bank having breached in seven and the left in thirteen places.

6. The cause of the breaches is generally ascribed to the insufficient height of the banks. But to embank either this or the Kortilliar river, keeping in view the sandy nature of the soil, in a way sufficiently substantial, to enable them to carry maximum floods, would be a costly undertaking and of questionable advisability.

7. The cyclone seems to have passed along the coast from the southward, for a little to the west of Covelong occurred the heaviest individual case of damage, *i.e.*, the destruction of the body wall of the Taiyur tank new weir.

8. The calculated maximum depth of water over weir crest was exceeded, but in any case the weir body wall was too light, and in rebuilding it, the section should be increased, it is considered, to the dimensions already advocated.

9. In addition to the foregoing—

53 Imperial tanks,
56 minor tanks, and
23 tanks under the Palar anicut

have been breached or otherwise damaged.

10. Most of the damage is ascribable to low and weak places in the tank bunds and to wave erosion, facilitated by the absence of, or insufficient height of, revetments,

pointing to the necessity for a revision of the details on which tank repair estimates are being framed, the dimensions of bunds and levels to which revetments (even when allowed) are carried being quite inadequate.

11. The cost of making good flood damage in the Chingleput division will probably amount to Rs. 20,000 at least.

12. *South. Arcot.*—In this division, the damage during the cyclone of 5th and 6th November was confined to the northern portion, *i.e.*, the Tindivanam sub-division.

Rainfall measured at Tindivanam on the 5th, 8·3 inches.

Fourteen tanks * were breached and the slopes of many of the bunds of other tanks have been greatly damaged by wave action; had the high wind lasted much longer, the number of breached tanks would have been largely increased. The probable cost of repairs will be about Rs. 4,000.

* 12 tanks in Tindivanam.
2 do. Villupuram.

13. In the southern part of the division the heaviest rainfall and floods occurred between the 9th and 23rd November—

	Rainfall. INCHES.	Date.
Mannargudi	10·54	9th
Porto Novo	4·5	9th
Cuddalore	4·48	23rd
Shatiatope	7·35	22nd
Lalpet	11·54	22nd

14. The Vellar was in high fresh, a depth of 9 feet having passed over Shatiatope anicut on the 23rd.

The Veeranum tank weirs surplussed 2½ feet; water passed over the Lower anicut to a depth of 5·5 on the 25th.

Chidambaram was, as usual, on such occasions more or less under water, the Khan Saib's canal breaching in several places (cost of closing estimates at Rs. 950). As per a rough estimate, crops were damaged over an area of about 7,000 acres, but as most of the damaged crop has been replanted, on an assurance that the channels would be allowed to remain open until the end of March, there will be no loss to Government.

15. The Pelandorai anicut channel was damaged by cross drainage to the extent of about Rs. 500 (the means of passing cross drainage are insufficient). As far as could be ascertained, none of the anicuts had suffered to any appreciable extent.

There have been a few minor breaches in tanks in the Kullakurchi taluk.

16. *Tanjore.*—In proportion to the *duration* of the rainfall, Tanjore suffered considerably. On the 23rd, 24th, the maximum reading on the Cauvery dam was only 7·5 (6·5 gives full supply in the delta), so that the damage was entirely owing to the heavy local rainfall between Trichinopoly and Tanjore; rainfall as under on 23rd—

	INCHES.
Trichinopoly	6·61
Grand anicut	5·45
Negapatam	6·17

Many of the tanks south of the railway, including the six Imperial tanks to the west and south of the regulators, were breached, resulting in a large volume of water being thrown into the old Vennar,† breaching its right bank in 11 places above the regulators. So even had the head of the old Vennar been closed by the construction of the permanent dam, no material change in the behaviour of the flood water would have resulted.

† A depth of 5·6 passed over the dam at its head. The Kodumurti above Trichinopoly was also in flood.

17. On the 23rd water in rear of the Vennar regulator was reduced to 6·5, and although the shutters were raised only 0·10 feet water continued to rise, so at 4-30 P.M. on the 23rd the shutters were closed completely, still by 11-30 P.M. water had risen to 10·5 on the rear gauge.

The Cauvery in front having risen to 12·2 as much water as possible (7·7 feet) was passed into the Cauvery below the regulator, the falling shutters on the Grand anicut being down (with one exception, a depth of 7 feet passed over the Grand anicut). All that was possible had been done to relieve the delta.

Sill	184·25
	12·2
+	196·45

18. The excess of water thus thrown into the Vennar * was the cause of the excessive damage sustained by the Anunda Cauvery (which breached in 64 places) and by the Vadavar, as also by the Perambur tank (which breached in five places) into which the former falls.

* Water rose 2 feet above highest maximum at the Vettar head.

19. The drainage from the south is intercepted by both these channels, which surplus into the Vennar, and it is a question if the means of surplus should not be increased compared with the waterway of the South Indian Railway ; it is not nearly sufficient to pass off a sudden flood of the kind under notice.

20. The large breach in the Vadavar left bank about a mile west of Tanjore is partly attributed to the insufficient waterway of the bridge on the Thiruvadi road, but generally the banks were topped in all directions, and it seems probable that many of the breaches were caused by villagers cutting the banks to save their houses, &c. The low lying portions of Tanjore town were under water.

21. Lower down the delta, the chief damage was a breach 385 feet in length in the Vennar right bank, three-quarters of a mile above the Koriar head from this breach. The water passed into the Pamaniyar by breaching its right bank and overtopping the left bank, which forms the road from Nidamangalam to Mannárgudi, breached it in five places.

22. This flood water combined with local rainfall flooded (as usual) the south-east portions of the delta where all the rivers ran full, causing numerous breaches, the chief being two on the Pandaviar in the 71st and 81st miles, but still larger breaches of 350 and 250 feet in the 82nd and 84th miles of the Koriar, both banks of the Salavanar and Ponnakondanar distributaries of the Koriar were breached in many places.

23. Fortunately the rains were of short duration, so the floods quickly subsided and little or no loss of crop is anticipated.

24. In the north-east of the delta — Máyavaram taluk — was also, to some extent, flooded, particularly along the Palavar drain, in which the flood was the highest on record, *i.e.*, 6·1 on the crest of the Oopanar dam. The right bank is said to have been breached by the villagers a little below this dam.

25. The right bank of the Cauvery breached to a length of 40 feet in the 86th mile.

26. A new erosion is reported in the Coleroon right bank at Vadarangam (some 8 miles above the crossing of the South Indian Railway). At the Coleroon bridge the gauge reading was 14 feet on the 24th November.

27. The Vettar rose to 15·6 on the Vettar dam (above Chittar head) overflowing the banks, but doing little damage.

Lower down, however, near the 100th mile the road and bank breached to a width of 65 feet.

28. In the foregoing remarks are detailed generally the effects on the Tanjore delta of what may be called a slightly abnormal flood (paragraph 13 of Major Montgomerie's report, G.O. No. 363 I of 9th June 1881) slightly, inasmuch as water only rose to 7·5 on the Cauvery dam against a recorded maximum of 13 feet 3 inches ; what the results might have been had an abnormal flood, say, like that of 21st November 1880, when water rose to 11 feet and 10 inches on the Cauvery dam occurred, it may not be out of place to briefly consider.

29. As stated in paragraph 17 *supra*, although the Vennar regulator shutters had been completely closed, water in rear rose to 10·5. As much water was passed

into the Cauvery as it could safely carry consequently any additional water which a higher flood from the Cauvery would have brought down should have been discharged into the Coleroon over the Grand anicut. As it was water rose to a depth of 7 feet over its crest or + 196·45 against a maximum of + 203·47*.

* 203·47 in the flood of November 1858.

30. A depth of 5½ feet passed over the Lower anicut compared with a maximum of 12 feet in 1858.

31. In the flood of 1858 water rose 14·33 feet over the Grand anicut; on that occasion, however, there were no regulators to the Cauvery and Vennar, which, drawing off large volumes of water, caused great loss and danger to the delta.

32. Should such a flood again occur, as is quite probable whatever may be the theories on the subject, it is not believed that nearly so large a proportion of the water could be disposed of through the delta as has been calculated on as, with the regulators available to shut out flood water the popular outcry against their being opened to any great extent to pass *more* water than the rivers of the delta could carry without doing serious damage would be loud and sustained. Consequently, the Coleroon may have to carry more than the 300,000 cubic feet per second hitherto contemplated.

33. But even in a flood lower than a maximum one, it seems certain that the Grand anicut will be called upon to dispose of a much larger quantity of water than it did during the maximum flood of 1858, and that therefore the proposal advocated by Major Montgomerie in paragraph 44 of his report (G.O., No. 363 I of 9th June 1881) to construct an entirely new regulating work in lieu of the Grand anicut was a sound one.

34. Any how, some additional means of passing more water into the Coleroon seems imperatively necessary, whether by means of an entirely new work, by means of additional under-vents in the Grand anicut, or by means of a new surplus sluice a little higher up the river, is a question for careful consideration.

35. During the late floods when the Grand anicut passed over a depth of only 7 feet, the afflux being 5·45, the left bank above the anicut forming the road to Trichinopoly is reported to have breached, its general level is low, so in a high flood it would probably be almost wiped out altogether.

36. Regarding breaches of the various river banks in the delta, it may be asked what is proposed to be done to prevent a recurrence of them.

The reply is that they are to a very great extent unavoidable. As to embank the rivers to render them capable of carrying off abnormal rainfall would be hopeless, and, even if done, would only intensify the danger.

Indeed it is a question if the system of banking has not been carried too far; a flood like that of 1858 would now in all probability cause far more damage than was then sustained. When allowed to spill quietly over the country, water for a few days does little or no damage to crops. On this occasion there has been but little loss.

37. *Damage in Pattukkottai taluk.*—The rainfall gauged at Arantangi between 14th and 22nd November amounted to 5·4 inches, on the 23rd 13 inches, and on the 24th 11·75 inches and these abnormal falls have caused extensive damage to tanks.

38. Of the 38 on the Imperial list only the eleven tanks * provided with sufficient means of surplus have escaped being breached. The greatest amount of damage has been amongst the tanks under the Vellar and Pambattiyar rivers.

* Imperial list numbers.
No. 25
" 27
" 28
" 31
" 33
" 34
" 35
" 45
" 50
" 51
" 55

The number of breaches per tank vary from five to twenty. For two of the tanks, Neivali and Poovalur, which are close to the rivers Agniar and Vellar and have been encroached upon by the rivers, necessary repairs are roughly estimated at Rs. 2,000 each.

For the remainder—23 tanks at an average of Rs. 300 each—will cost say Rs. 7,000; two tanks slightly breached Rs. 250; or in all approximately Rs. 12,000; for 18 of those damaged, repair and improvement estimates have already been sanctioned under Tank Restoration Scheme and no doubt the remainder will shortly be taken up.

About 150 of the minor tanks under the Revenue Department are reported to be breached, for this class 134 have had estimates sanctioned under Tank Restoration Scheme.

39. *Approximate total cost of flood damages in the circle.*—As far as present available information indicates, the total approximate cost of damage caused by the heavy rains of November last in the circle will be as under:—

	RS.
Chingleput division	20,000
South Arcot do.	4,000
Tanjore do.	12,000
Negapatam proper	8,000
Pattukkottai	12,000

No. 85 I.

Submitted for the information of Government.

2. Instructions have already been issued * to the Superintending Engineer, V Circle, for investigating the disposal of the flood waters in the Coleroon river.

* Memo. No. V/10 T.J., dated 22nd January 1894.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

5th July 1894.

Order—dated 10th July 1894, No. 520 I., Public Works.

Recorded.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Superintending Engineer, V Circle.
„ Chief Engineer for Irrigation.
„ Revenue Department.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 10th.

Recd. *Encl.*

G.O., 10th July 1894, No. 520 I.

JULY.

Damages to Irrigation Works

Note by the Chief Engineer for Irrigation submitting a general descriptive summary of the — in the V Circle caused by the floods of November 1893, recorded.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following papers :—

From	Superintending Engineer, II Circle, dated	7th	February	1894,	No.	2653	K.S.
To	"	"	"	"	13th	"	"	"	20	"
From	"	"	"	"	20th	"	"	"	2779	"
To	"	"	"	"	28th	"	"	"	40	"

From the Executive Engineer, Kistna Eastern Division, to the Superintending Engineer, II Circle, dated 23rd May 1894, No. 937.

I have the honour to resubmit the plans and estimates for constructing ramps on Bantumilli canal and its extension, amounting to Rs. 7,170,* forwarded to late Gudiváda division with your office No. 2971 K.S., dated 10th March 1894, with Chief Engineer's remarks on the subject for your approval and sanction, making necessary alterations as stated below :—

* Corrected in Superintending Engineer's office to Rs. 7,290.

(1) The bridge proposed for the ramp at 3 miles for Daggumilli crossing has already been sanctioned and forwarded to late Gudiváda division with your office No. 2502 K.S., dated 19th January 1893. As the work has already been completed neither estimate for the bridge nor alterations in the plans have been made.

2. The ramp at 8 miles 3 furlongs has been altered similar to the proposed ramp at 11 miles 2 furlongs as stated in Chief Engineer's memo. No. II/40 K.S., dated 28th February 1894, fixing the top of the ramp at highest F.S.L. + 1·50 as that of the other ramps now submitted.

Enclosures.

Report to accompany an estimate for constructing ramps on Bantumilli canal.

	RS.
Estimate	7,290

This estimate provides for the construction of 15 ramps on the Bantumilli canal at the mileages given in the general abstract. Each ramp is 20 feet wide and with side slopes of 1 in 6 where there is bandy traffic and 1 in 5 where it is only expected that cattle will cross the canal. The slopes of the cutting through the berm and bank are $1\frac{1}{2}$ to 1 and are protected with a revetment of rough stone to prevent cattle climbing up and destroying them. The following notes with regard to each ramp are submitted :—

(1) *Ramp at* 1 *mile* 4 *furlongs.*—This is on the donka connecting the villages of Cowtaram and Kurada. Here there are three channels to be crossed—the Bantumilli canal, the Bantumilli south side channel and a side channel from it. Amount of estimate Rs. 700.

(2) *Ramp at* 1 *mile* 7 *furlongs.*—This is on the donka connecting Daggumilli and Cowtaram; there is a large cattle traffic across the canal at this point. The ramp is similar to No. 1. Amount of estimate Rs. 630.

(3) *Ramp at* 3 *miles.*—This ramp is on the line of bandy traffic to Bandar from the villages between the Polraz and Bantumilli canals. A bridge has recently been built across the Bantumilli south side channel. Amount of estimate Rs. 330.

(4) *Ramp at 6 miles 1½ furlongs.*—This ramp will cross the Kamalapuram north side channel and the Bantumilli canal and the Kamalapuram south side channel. As the F.S.L. in the side channels is much higher than in the main canal, this ramp is very necessary to prevent the frequent breaches made by cattle.

(5) *Ramp at 8 miles 3 furlongs.*—Here there is a large bandy traffic to Bandar from the villages along the Bantumilli main distributary. The facilities for the passage of bandies are much greater. Amount of estimate Rs. 790.

(6) *Ramp at 11 miles 2 furlongs.*—This ramp is mainly for cattle and crosses the Kamalapuram north and south side channels. The slopes are 1 in 5. Amount of estimate Rs. 690.

(7) *Ramp at 13 miles 2 furlongs.*—Amount of estimate Rs. 340.

(8) *Ramp at 14 miles 3 furlongs.*—Amount of estimate Rs. 340.

(9–15) Seven ramps are provided along the Bantumilli canal extension at the mileages shown on the plan. They are all of the same type and at present will be mainly for cattle, but later on, as the irrigation along this canal developes, there will be a considerable bandy traffic. The estimate for the 7 ramps is Rs. 2,720.

8th December 1893.

(Signed) A. CHATTERTON,
Ex. Engr., Gudiváda Division.

Estimate Form—Abstract—Classified.

Sub-head.	Names of works.	Amount of estimate for individual work.	Total of sub-heads.	Total for each canal or distributary.	Total of each main head.
1	2	3	4	5	6
	Capital Expenditure not charged to Revenue.	RS.	RS.	RS.	RS.
	49. *Irrigation.*				
	Kistna Delta System.				
	Eastern Section.				
	I. Works. Bantumilli Canal.				
	2. Main Canal and Branches.				
15. Miscellaneous ..	1. Ramp at 1 mile 4 furlongs	700			
Do. ..	2. Do. at Cowtaram to Daggumilli crossing ..	630			
Do. ..	3. Do. at 3rd mile	330			
Do. ..	4. Do. at Chennur crossing	750			
Do. ..	5. Do. to Vurvi crossing	790			
Do. ..	6. Do. to Satalur do.	690			
Do. ..	7. Do. to Arthamur crossing	340			
Do. ..	8. Do. to Patchapuram crossing	340			
Do. ..	9. Seven ramps for the extensions	2,720			
			7,290	7,290	7,290

23rd May 1894,

(Signed) C. A. SMITH,
Ex. Engr., Kistna Eastern Division.

No. 616 K.S.

Forwarded to the Chief Engineer for Irrigation with reference to his No. II/40 K.S., dated 28th February 1894.

18th June 1894.

(Signed) W. L. C. BADDELEY, Major, R.E.,
Superintending Engineer, II Circle.

No. 86 I.

Submitted to Government.

28th June 1894.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

ORDER—dated 10th July 1894, No. 521 I., Public Works.

The estimate, amounting to Rs. 7,290, for constructing ramps on the Bantumilli canal, Kistna Eastern delta, is sanctioned, Rs. 3,230 of the proposed expenditure being met from the provision made for items 158 to 166 in the classified abstract estimate printed in Proceedings of the Madras Government, No. 857 I., dated 11th October 1893, and the balance, Rs. 4,060, from the sum available for unforeseen works of the Kistna delta system which will then be reduced to Rs. 1,15,435.

2. This sanction is registered as No. 50 I. of 1894-95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 10th.

Recd. *Encl.*

G.O., 10th July 1894, No. 521 I.

JULY.

Ramps

Estimate, amounting to Rs. 7,290, for constructing — on the Bantumilli canal, Kistna Eastern delta, sanctioned with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Establishment.

READ—the following paper :—

From C. J. WEIR, Esq., Acting Collector of Ganjám, to the Secretary to Government, Public Works Department, Irrigation Branch, dated Berhampur, 20th June 1894, R. C. No. 940/Ver.

Vide G.O. No. 12 I., dated 10th January 1894.

I have the honour to forward copy of letter No. 560, dated 15th June 1894, from the Executive Engineer, Rushikulya project, and to state that I consider that the services of the Special Deputy Collector will probably be required up to *31st December* 1894. I would ask sanction to his retention up to that date. I am asking the Executive Engineer to use all endeavours to decide as early as possible what lands are still to be acquired, so that the Deputy Collector may finish the work by December next.

ENCLOSURE.

From A. G. ROMILLY, Esq., Executive Engineer, Rushikulya division, to the Collector of Ganjám, dated Berhampur, 15th June 1894, No. 560.

I have the honour to request that the services of the Special Deputy Collector may be placed at my disposal for a further period of six months; as he was absent on leave for a month, I would be glad if one of the months be considered as equivalent to the one in which he was on leave.

It is likely that land will be taken up for distributaries Nos. 8, 9, 10A, 10B, 11, 13 and 15 before December, but it is impossible to make any reliable estimate of the amount of land required as this depends entirely on the amount of land irrigable by the channel, and this cannot be determined till the line is laid out. The approximate number of miles of channel will, I expect, be thirty or forty, which may possibly serve as a guide to the amount of work to be done by the Special Deputy Collector.

ORDER—dated 12th July 1894, No. 524 I., Public Works.

The further retention up to 31st December 1894 of the establishment sanctioned in G.O. No. 532 I., dated 13th June 1892, for settling compensation for land required for the Rushikulya project, is sanctioned. Rs. 5,000 have been provided to meet the cost of this establishment in the revised estimate for the project—*vide* item 11 printed in Proceedings of the Madras Government, No. 13 I., dated 10th January 1894.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, I Circle.
" Collector of Ganjám.
" Revenue Department.
" Examiner, Public Works Accounts.

IRRIGATION.
ESTABLISHMENT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 12th.

Recd. *Encl.*

G.O., 12th July 1894, No. 524 I.

JULY.

Establishment

The further retention up to 31st December 1894 of the — for settling compensation for land required for the Rushikulya project, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—again the following paper:—

G.O., dated 3rd May 1880, No. 281 I., Public Works.

READ—also the following paper:—

Proceedings of the Board of Revenue (Land Revenue), dated 29th June 1894. Mis. No. 3587.

Read—the following letter from Lieut.-Colonel R. R. E. DRAKE-BROCKMAN, R.E., Chief Engineer for Irrigation, to the Secretary to the Board of Revenue (Land Revenue), dated 21st June 1894, No. 330 M.

I have the honour to request that you will inform me whether there is any objection to a proposal made by the Superintending Engineer, V Circle, that all trees on irrigation works where no establishment is maintained by this department should be handed over to the Revenue Department subject to certain conditions. The result of the present system is that trees on Minor Irrigation Works, Public Works Department, are practically in charge of no one, as this department cannot employ establishment solely to look after trees.

2. I would suggest the following conditions:—

(*a*) That all trees on irrigation works shall be in charge of the Revenue Department except those on canal, channel, river and tank banks which are enumerated in a special list for each district.

(*b*) That the Public Works Department may order the removal of trees considered necessary to be removed in the interests of irrigation and to keep inspection path clear may cut branches and shrubs growing across tops of banks, such trees, branches or shrubs being handed over to the village officers for disposal.

(*c*) That whenever an order is issued to cut trees or branches or to remove shrubs on irrigation works other than those in charge of Public Works Department, the Revenue Department Divisional officer shall be informed.

3. If this proposal meets with the approval of the Board, orders will be issued to Superintending Engineers to prepare the necessary lists.

Resolution—dated 29th June 1894, Mis. No. 3587.

The Board has no objection to the Chief Engineer's proposal contained in the letter read above. It is understood that the revenue will go with the control and with regard to particular works Collectors will decide whether the control will be exercised by the District Forest officer or the Divisional officer.

(True Copy and Extract.)

(Signed) L. M. WYNCH,
Secretary.

ORDER—dated 14th July 1894, No. 527 I., Public Works.

The proposal of the Chief Engineer for Irrigation to transfer to the Revenue Department all trees on irrigation works under the charge of the Public Works Department except those on canal, channel, river and tank banks which are enumerated in a special list for each district is approved subject to the conditions suggested in paragraph 2 of his letter to the Board of Revenue and those in the Board's Proceedings.

2. Superintending Engineers will arrange for preparing the special lists referred to above and communicating them to the Collectors concerned.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
,, all Superintending Engineers.
,, the Superintendent of Works, No. I Periyár Division.
,, the Revenue Department.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 14th.

Recd. *Encl.*

G.O., 14th July 1894, No. 527 I.

JULY.

Trees on Irrigation Works

The proposal to transfer to the Revenue Department all — under the charge of the Public Works Department except those on canal, channel, river and tank banks as detailed in a special list for each district, approved subject to certain conditions.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

From J. E. PAUL, Esq., Executive Engineer, in charge I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 18th June 1894, No. 168 V.Z.

I have the honour to forward herewith an estimate, amounting to Rs. 2,430, for improving Venkamma Buttai channel, Palkonda taluk, and to request that you will be good enough to obtain the sanction of Government to the same.

2. The necessity for the improvements has been explained in the report which accompanies the estimate.

ENCLOSURE.

REPORT to accompany the estimate for improving the Venkamma Buttai channel, Palkonda taluk.

Position and course of the channel.—The Venkamma Buttai channel is the second irrigation channel from the left bank of the Nagavalli river in the Palkonda taluk. It takes off from the river 5 furlongs below Gopidevipet Agraharam and runs nearly parallel to the river for a distance of 10 furlongs 460 feet (*vide* sketch map, sheet No. 1). Branch channels are taken off at 3 furlongs 480 feet and at 10 furlongs 460 feet for the irrigation of lands in Chinna Mangalapuram and Gotta Mangalapuram villages.

Below 10 furlongs 460 feet the main channel turns to the left and at 16 furlongs 600 feet is carried across the Neelanagaram drainage channel by an aqueduct. It irrigates the lands of the Tampatapalli village. The total length of the channel from the head to tail is nearly 4 miles.

2. *Ayacut under the channel.*—The total area of lands irrigated by the channel is 1,140 acres, 180 acres under each of the Chinna and Gotta Mangalapuram branches, 30 acres under field channels direct, and 750 acres under the main channel and its branches below Tampatapalli aqueduct.

3. *State of the channel and existing works.*—As in the case of all the irrigation channels from the Nagavali river in Palkonda taluk the Venkamma Buttai channel takes off from the river by an open head. There being no head sluice, a large quantity of water enters the channel during the high freshes and subjects the works and irrigation under it to breaches. The first reach of the channel which runs in deep cutting and through bad soil is heavily silted up and requires to be cleared.

There is no regulator at present for the supply of Chinna Mangalapuram branch channel, but one is very necessary, as the lands under the branch channel are on a high level and as the falls of this and the main channels vary. The existing regulator at the head of Gotta Mangalapuram branch requires to be improved by raising its crest lenel and rebuilding its cracked wings and apron.

4. *Works proposed.*—The following are the works now proposed :—

	RS.
Constructing a head sluice	1,680
Do. a regulator for Chinna Mangalapuram branch ...	410
Improvements to the regulator at the head of Gotta Mangalapuram branch	340
Total ...	2,430

5. *Head sluice.*—The site for head sluice will be 100 feet below the point where the right bank of the channel begins (*vide* sketch, sheet No. 2), no better site being available higher up. The sluice will have two vents of 4′ × 3′ each with screw gearing shutters for regulation (*vide* plan, sheet No. 4 for details).

Regulator for Chinna Mangalapuram Branch Channel.—This will be constructed at site shown in sheet No. 2 as per plan and sections given in sheet No. 5, the sills of the regulator vents and branch channel sluice being placed on the same level. The regulator vents will be provided with shutters. One vent will be almost sufficient to supply the ayacut under the main channel below the regulator; but two vents are provided to allow the channel above to be cleared when necessary. The crest level of the regulator is so arranged that the channels may get their full supply when the water does not head up above the F.S.L. in rear of the head sluice. The foot-path will be carried by an arch.

Existing regulator for the supply of Golta Mangalapuram Branch Channel (*sheet No.* 2).—This will be improved as shown in detail in plan sheet No. 6. The body and front wings of the regulator and branch channel vent are in good order and will be retained. Rear wings of the regulator will be rebuilt, the old scoured out apron being replaced by a cushion of $1\frac{1}{4}$ feet in depth. The old and cracked retaining wall will be allowed to remain as a sort of bond in the middle of the new apron in rear of cushion. The crest of the regulator will be raised to + 85·26 as shown in plan. The branch channel sill will be placed at + 84·51 or 9″ lower than that of the regulator vents which will be provided with shutters. One vent will be sufficient for the supply of lands under the main channel below regulator, but two are allowed to enable the channel above being kept clear of silt.

6. *Hydraulic calculations.*—The head sluice is designed to discharge 24 cubic feet per second with 1·15 feet of water in rear and 0·16 foot head, which will be sufficient for the ayacut of 1,140 acres under the channel allowing $2\frac{3}{4}$ cubic yards per hour per acre. Further hydraulic details are given on the plan of each masonry work.

The formulæ used in calculating the discharges are as follows:—

For head sluice and regulator vents $D = cl\ \sqrt{2gd} \times (dd + \frac{2}{3}d)$, C being taken as 0·73.

For branch channel vents $D = CA\ \sqrt{RS}$. C being taken as 48.

For fall over regulators $D = 3{\cdot}34\ ld\ \frac{3}{2}$.

For drainage channel discharge $D = \frac{1}{3} \times 400 \times M\ \frac{3}{4}$, M being the drainage area in square miles consisting mostly of flat cultivated lands which moderate the rain discharge.

(Signed) G. F. HANDCOCK,
Ex. Engr., Vizagapatam Divn.

ORDER—dated 16th July 1894, No. 528 I., Public Works.

The following estimate is sanctioned:—

Irrigation.
43. Minor Works and Navigation.
Minor Works for which neither Capital nor Revenue Accounts are kept, P.W.D.
Vizagapatam Division.
Original Works.

	RS.
Improving Venkamma Buttai channel, estimate	2,430

2. This sanction is registered as No. 51 I. of 1894–95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, I Circle.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 16th.

Recd. *Encl.*

G.O., 16th July 1894, No. 528 I.

JULY.

Channel

Estimate of Rs. 2,430 for improving Venkamma Buttai —, Vizagapatam division, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper:—

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated Bezwada, 22nd June 1894, No. 678 K.S.

In reference to G.O., No. 258 I., dated 20th March 1894, I have the honour to forward copies of letter No. 36 S., dated 23rd April 1894, from the Executive Engineer, Kistna Western Division, and my reply thereto, No. 283 K.S., dated 15th May 1894.

2. It will be observed that the report printed with the Government order refers to work not included in the plan and estimate for Rs. 4,340, viz., the masonry silt trap at the head of the pipe and the wire screens to prevent anything passing into the pipe which might cause an obstruction. It would have been better if the report had been recast so as to agree with the plan and estimate as revised in this office.

3. Mr. Malet has now sent in a revised estimate and I have prepared a comparative statement showing the items in which it differs from the sanctioned estimate.

4. The main point is whether the bed of the drain shall be protected from scour or not, as the provision of this item means an expenditure of Rs. 1,820. It is, I am afraid, impossible to dispense with this protection unless we are prepared to run the risk of the pipe being carried away by a flood.

5. The estimate still provides for some work in cement, but I will take up this question with the Executive Engineer and if possible substitute surki mortar throughout. As the amount of work to be done in cement is not large, I have not altered the estimate.

6. With these remarks, I have the honour to forward for your orders the revised plan and estimate of Rs. 6,680 together with a comparative statement and request the favour of early orders as the work has been commenced.

ENCLOSURE.

From the Executive Engineer, Kistna Western Division, to the Superintending Engineer, II Circle, dated 23rd April 1894, No. 36 S.

In returning the tracing of pipe syphon and estimate sanctioned in G.O., No. 258 I., dated 20th March 1894, I have the honour to point out the following difficulties in connection with the alterations effected in your office and request your instructions regarding them.

Paragraph 8 of the report explains the necessity of the masonry chamber and screens at the head of the pipe.

The masonry chamber having been cut out, I shall not be able to fit the screens and there is no provision for a well or space for the deposit of silt in front of the pipe.

Superintending Engineer's remark.

According to G.O., No. 258 I., of 20th March 1894, the masonry chamber is to be built.

I look on the provision of this well and screens as essentially necessary for the satisfactory working of the pipe.

Prevention is better than cure and considering the great expense and delay involved in cleaning out the pipe should silt be deposited in it, it would prove economical in the long run to prevent silt getting in.

It would be better, I consider, to build the head walls as designed by me and omit the chain estimated to cost Rs. 120.

It will be necessary to put up winding gear at each end to work this chain on account of its weight. If something has to be laid in the pipe, I think, on further consideration, that a 3-strain galvanized wire would be cheaper, lighter and equally effective. The masonry chamber at rear end of pipe can be altered as proposed by you without any inconvenience.

Considering that the sub-soil is almost pure sand, I venture to submit that it is dangerous to omit the apron and revetments. With 10 or 11 feet depth of water in the drain during floods and a low tide, the velocity would be very considerable and I think there would be a serious risk of the 8 feet piles being scoured out and the pipe washed away. My impression is that the protection afforded by the apron and revetments is barely sufficient.

I am of course prepared to accept and act on your orders, but the point is such a serious one that I should like to put my opinion on record. There are scour holes in bed of the old line of the drain and below the bridge going down to 8 feet below floor of bridge which is at —4·78 and the velocity in the new straight cut will probably exceed that in the old line of the drain.

I should very much like to put down wells and a curtain wall, but I thought the apron would stand long enough to allow of our judging whether any additional protection was necessary.

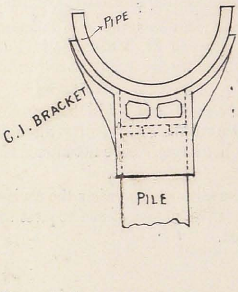
In the method of supporting the pipes in the piles, I would also point out that your proposal means baling out water to about —7·50 in a saturated sand sub-soil in order to get the bolts in.

I think it will be necessary to add another Rs. 500 to the provision for baling if this is to be done.

Superintending Engineer's remark.

Cast iron caps should be used to carry the pipe.

I would again venture to suggest the adoption of my original proposal of a cast iron cap to fit on the top of the pile without any bolt and which you objected to when I first sent up the design in pencil. I would request a perusal of the report in the revised estimate of the Tungabhadra drain printed with G.O., No. 447 I., dated 9th May 1892, with reference to the discharge of this drain and water-way provided.



From the Superintending Engineer, II Circle, to the Executive Engineer, Kistna Western Division, dated 15th May 1894, No. 283 K.S.

[*Reference.*—Executive Engineer's No. 36 S., dated 23rd April 1894.]

In returning herewith the estimate, amounting to Rs. 4,340, for the construction of a pipe syphon under Tungabhadra straight cut at Buddam sanctioned in G.O., No. 258 I., dated 20th March 1894, has the honour to request the Executive Engineer will be good enough to revise the design and estimate with reference to the following remarks:—

(1) The masonry chamber at the head of the pipe as well as the screens can remain as originally designed.

(2) The pipes should be arranged as corrected in this office, but the pipe should be supported on cast iron caps as proposed by the Executive Engineer.

(3) The apron and revetment can remain as originally designed.

(4) A small galvanized wire rope can be laid in the pipe; if a heavy rope or chain be laid the object is defeated as it cannot be moved by hand. Winding a rope upon a winch is not an effective method of stirring up the silt in the pipe.

Order—dated 16th July 1894, No. 529 I., Public Works.

The following revised estimate is sanctioned in lieu of the estimate of Rs. 4,340 sanctioned in G.O., No. 258 I., dated 20th March 1894, the excess of Rs. 2,340 being met from the balance of the lump sum of Rs. 1,80,000 provided for masonry works on the Tungabhadra drain in the statement (*vide* item 704) printed in Proceedings of the Madras Government No. 857 I., dated 11th October 1893 :—

Capital Expenditure not charged to Revenue.
49. Irrigation.
Kistna Delta System.
Western Section.
I. Works.
4. Drainage and Protective Works.
Tungabhadra Drain.
3. Works.

	RS.
Syphon under Tungabhadra straight cut at Buddam, estimate ...	6,680

2. This sanction is registered as No. 52 I. of 1894–95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, II Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 16th.

Recd. *Encl.*

G.O., 16th July 1894, No. 529 I.

JULY.

Syphon

Revised estimate of Rs. 6,680 for — under Tungabhadra straight cut at Buddam, Kistna Western division, sanctioned with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following papers :—

From the Superintending Engineer, II Circle, dated 2nd May 1894, No. 205 K.S.
To „ „ „ „ „ 9th „ „ „ 82 K.S.

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated Bezwada, 10th June 1894, No. 549 K.S.

In resubmitting the four enclosures returned with your No. II/82 K.S., dated 9th May 1894, I have the honour to state that only one distributary, East side channel of Dondapad tank, will be dug, the West side channel having been abandoned and there will be a saving of Rs. 5,102 as noted below :—

	RS.
Channel	2,820
Sluice	2,282

2. The area to be irrigated under the East side channel is 1,680 acres as already stated in paragraph 3 of the Executive Engineer's report which accompanied the estimate.

ENCLOSURE.

REPORT to accompany the revised estimate for excavating East side channel to Dondapad tank.

	RS.
Estimate	4,280

The original estimate proposed to irrigate under this channel 950 acres only and to irrigate the remaining under a west distributary. As sufficient lands are available under East side channel, this revised estimate has been prepared.

2. The channel will start from the sluice on the left wing of the surplus weir and extend 3 miles 5 furlongs. It will run in 2′ 6″ cutting throughout except for a length of 600 feet at the head where there is heavy cutting and at sites of cross drainages where the channel will run in banking. The soil through which the channel runs is either soft rock, hard kunker or gravel. In soft rock the slopes of channel will be ½ to 1 and in other places 1 to 1. At sites of vagus the left bank will be omitted and water allowed to spread itself to F.S.L. of channel and the drainage water surplused by suitable outlets on the right.

3. Tabular statement of channel is given in the survey sheet. The total average to be irrigated under the channel is 1,680 acres. To avoid direct irrigation masonry sluices have been provided at suitable places in consultation with the village officers. These sluices will be of the most simple type.

4. The channel will have banks on both sides, the left bank being 3 feet above ground level and the right 2 feet. The object of making the left bank 3 feet above ground level is to prevent the cross drainage from silting up the channel. Extra earth required for the bank will be taken from the left side having a margin of 6 feet beyond the toe of bank, and care will be taken so to excavate the pits as to serve as side or catch drains.

ESTIMATE FORM—Abstract—Classified.

Sub-head.	Names of works.	Amount of estimate for individual work.	Total of sub-heads.	Total for each canal or distributary.	Total of each main head.
1	2	3	4	5	6
	IRRIGATION.	RS.	RS.	RS.	RS.
	43. MINOR WORKS AND NAVIGATION.				
	Minor Works for which Capital and Revenue Accounts are kept.				
	Capital Account.				
	Dondapad Tank Project.				
	I. Works.				
	(2-A) Reservoirs.				
	Dondapad Tank.				
	(3) Distributaries.				
	East Side Channel.				
2. Land	1. Compensation for land	330	330		
3. Works ..	2. Masonry head sluices at the head of each minor channel	350	350		
3. Works ..	Outlets for cross drainage	200	200		
4. Earthwork ..	Excavating the channel	3,280	3,280		
5. Miscellaneous ..	Demarcation stone	120	120		
				4,280	
					4,280

(Signed) A. A. G. MALET,
Ex. Engr., Kistna Western Division.

6th March 1894.

To the Superintending Engineer, II Circle, dated 18th June 1894, No. 101 K.S.
From " " " " 30th " " " 720 K.S.

No. 87 I.

Submitted to Government. If the present estimate be sanctioned a saving of Rs. 5,102 will be effected in the sanctioned provision for the Nadigedda tank supply or West side channel of Dondapad tank project as shown below:—

	RS.
2. Land	360
3. Works	2,282
4. Earthwork	2,372
5. Miscellaneous	88
Total ...	5,102

Against the above sum an expenditure of Rs. 1,481 is reported to have been already incurred, but this outlay will, the Superintending Engineer states, be written back when the materials that were collected are transferred to some other work.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

6th July 1894.

ORDER—dated 16th July 1894, No. 530 I., Public Works.

The revised estimate, amounting to Rs. 4,280, for excavating the East side channel of Dondapad tank project, is sanctioned in lieu of the provision of Rs. 1,740 made for the work in the sanctioned estimate for the project printed in Proceedings of the Madras Government No. 191 I., dated 25th February 1892, the excess of Rs. 2,540 being met from the saving of Rs. 5,102 indicated in the foregoing endorsement of the Chief Engineer for Irrigation.

2. This sanction is registered as No. 53 I. of 1894-95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 16*th.*

Recd. *Encl.*

G.O., 16th July 1894, No. 530 I.

JULY.

Dondapad Tank Project

Revised estimate amounting to Rs. 4,280 for excavating the East side channel of —, Kistna Western division, sanctioned with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following paper :—

From S. D. PEARS, Esq., Superintendent of Works, No. I Periyár Division, to the Chief Engineer, Public Works Department, dated Periyár, 7th July 1894, No. 69 C.E.

I have the honour to submit herewith, for your approval and the sanction of Government, an estimate for Rs. 6,000 for maintenance and repairs of tools and plant.

2. As there have been several additions to the tools and plant in this division during the last two seasons and will be more in this, the estimate for this year is larger by Rs. 1,000 than that for previous years.

Order—dated 18th July 1894, No. 531 I., Public Works.

The estimate submitted with the foregoing letter is approved. The formal sanction of Government thereto should be applied for from the amount provided for further outlay under Tools and Plant in the revised estimate for the Periyár project submitted in Proceedings of the Madras Government, No. 97 I., dated 3rd February 1894, for the sanction of the Government of India as soon as that sanction is communicated to the Superintendent of Works, No. I Periyár Division.

(True Extract.)

(Signed) J. PENNYCUICK, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
„ Superintendent of Works, No. I Periyár Division.
„ Examiner, Public Works Accounts.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 18th.

Recd. *Encl.*

G.O., 18th July 1894, No. 531 I.

JULY.

Tools and Plant, No. I Periyar Division

Estimate of Rs. 6,000 for repairs and maintenance of — for 1894–95, approved, and formal sanction thereto ordered to be applied for on receipt of Government of India sanction to the revised estimate for the project.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following papers:—

From Colonel A. T. FRASER, R.E., Superintending Engineer, III Circle, to the Chief Engineer for Irrigation, dated Bellary, 15th June 1894, No. 730.

I have the honour to forward an estimate, amounting to Rs. 170, for heavy engine oil required for the Kurnool division.

The Executive Engineer, Kurnool division, states that on the long run this oil is found to be cheaper than cocoanut oil and it has the advantage of not being worked off by the first shower of rain.

This oil has no local value and cannot be used for any other purpose than for cleaning the screw gearing, &c., of which there are a large number all along the canal.

To the Superintending Engineer, III Circle, dated 22nd June 1894, No. 9 K.C.
From „ „ „ „ 2nd July „ „ 792.

No. 90 I.

Submitted to Government.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

16th July 1894.

Order—dated 19th July 1894, No. 534 I., Public Works.

The following estimate is sanctioned:—

Irrigation.
42. Major Works (Working Expenses).
Maintenance and Repairs.
Kurnool-Cuddapah Canal.
2. Main Canals and Branches.
9. Navigation Works.

	RS.
Purchasing two casks of heavy engine oil, estimate	170

2. This sanction is registered as No. 54 I. of 1894–95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, III Circle, with one estimate.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 19*th.*

Recd. *Encl.*

G.O., 19th July 1894, No. 534 I.

JULY.

Heavy Engine Oil

Estimate of Rs. 170 for purchase of two casks of — for use in the Kurnool division, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following papers :—

From the Superintending Engineer,	V Circle,	dated	5th	April	1894,	No.	132 E.I.
To	„	„	V „	„	13th	„	„	„ 39 T.J.
From	„	„	V „	„	19th	„	„	„ 157 E.I.
To	„	„	V „	„	30th	„	„	„ 46 T.J.

From J. C. LARMINIE, Esq., Superintending Engineer, V Circle, to the Chief Engineer for Irrigation, dated Chepâk, 26th June 1894, No. 241 E.I.

With reference to your memorandum No. 39 V./T.J. of 13th April 1894 and in continuation of my letter No. 132 E.I. of 5th April 1894, I have the honour to submit herewith, for sanction, a revised plan and estimate for constructing a head sluice to Therumalam channel in Nannilam taluk of the Tanjore division.

2. The amount of the estimate is the same as that previously submitted.

ENCLOSURE.

REPORT to accompany the estimate for constructing a head sluice to Therumalam branch channel, Noolar right bank.

	RS.
Amount of estimate	450

Therumalam channel takes off the Noolar right bank and just below road No. 35 branches off into two, of which the left one on high level is to irrigate the lands of Kothangudi, &c., villages.

2. To irrigate the lands under the high level channel, it is customary to erect a mud dam across Therumalam channel. This entails trouble and expense which are now increased by the offtake being carried a short distance lower down owing to the construction of the Máyavaram-Muttupet Railway.

3. This estimate provides for building a head sluice at head of Therumalam branch as per plans and estimate accompanying and for opening a new head to Kothangudi channel below the railway line. For effecting the new bifurcation, the owner of the lands concerned is willing to give the required land without compensation.

4. The interested mirasidars have contributed a moiety of the cost and have deposited Rs. 280 in the Government treasury at Negapatam.

5. *Specification.*—Work will be done according to standard specification.

(Signed) T. T. RAGHAVACHARI,
Assistant Engineer.

1st June 1894.

No. 91 I.

Submitted to Government.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

16th July 1894.

ORDER—dated 20th July 1894, No. 535 I., Public Works.

The following estimate is sanctioned, a moiety of the proposed outlay *plus* the usual percentages for establishment and tools and plant being met from contributions from the ryots interested in the execution of the work:—

Irrigation.
42. Major Works (Working Expenses).
Cauvery Delta System.
Extensions and Improvements.
(3) Distributaries.
(3) Works.

	RS.
Constructing a head sluice to Therumalam channel, estimate	450

2. This sanction is registered as No. 55 I. of 1894-95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lieut.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, V Circle, with four enclosures.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 20th.

Recd. *Encl.*

G.O., 20th July 1894, No. 535 I.

JULY.

Therumalam Channel

Estimate of Rs. 450 for constructing a head sluice to —, Tanjore division, sanctioned with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper:—

From N. F. MACKENZIE, Esq., Under Secretary to the Government of India, Public Works Department (Civil Works—Irrigation), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 6th July 1894, No. 134 I.

I am directed to acknowledge the receipt of Madras Government Proceedings No. 445 I., dated the 11th June 1894, and, under the circumstances therein stated, to communicate the sanction of the Government of India to the proposed demolition of the existing rest-house at Chettipett in the Gódávari Western division.

ORDER—dated 23rd July 1894, No. 536 I., Public Works.

Communicated to the officers concerned for information with reference to G.O. No. 444 I., dated 11th June 1894.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, I Circle.
" Examiner of Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 23rd.

Recd. *Encl.*

G.O., 23rd July 1894, No. 536 I.

JULY.

Rest-house at Chettipett

Letter from the Government of India conveying their sanction to the proposed demolition of the existing — in the Gódávari Western division, communicated to officers concerned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following papers :—

No. 448 T.

Report to accompany the estimate for the restoration of No. 4 Nilaiyur channel, No. 98 in the list of Imperial works.

General.—Nilaiyur channel takes off from the right bank of the Vaigai river, being the third offtake below the last anicut (Chittanai) across the river. It irrigates lands to the south of the river which are not likely to be affected by the Periyár project for many years to come, as that scheme is at present restricted to lands lying to the north of the Vaigai up to the Peranai anicut. Nilaiyur channel has an open head to which water is diverted from the river by means of a corambu which is annually constructed by the interested ryots. This system, though not altogether satisfactory, is not proposed to be interfered with as it has answered tolerably well and the cost of an anicut with the necessary head works would be prohibitive. It may be possible to improve the existing channels in this part of Madura by connecting them with existing or constructing new anicuts, but the investigation of any scheme of this magnitude is beyond the scope of the Tank Restoration Scheme and may well be deferred until the Periyár project is in working order when, no doubt, the extension of that system to channels on the south bank of the Vaigai will be considered. As indicated by the name, Nilaiyur channel terminates in the large tank of the same name, supplying on the way seventeen other tanks, of which two belong to the Madura Meenatchiamman devastanam.

Vaigai river.—Floods in the Vaigai are few and far between and in order to fill tanks connected with it the supply channels have to be of large carrying capacity. In the absence of any records on the subject it has been assumed that full supply will only be obtained for ten days in the year and that the channel must carry water at the rate of 0·15 cubic foot per second per acre after deducting 40 acres per square mile of catchment of tanks. This allowance of water corresponds with the supply allowed in the southern section of the Pálár anicut system where the conditions are somewhat similar.

2. *Irrigation.*—About 1,000 acres of wet land are supplied direct from the channel without any other source of supply. Of the balance, 750 acres are irrigated partly direct from the channel and partly from tanks and 4,248 acres depend solely on tanks. Full details of the ayacut area are given in statement A.

3. *Carrying capacity of the channel.*—As stated in paragraph 1 it has been assumed that full supply will only be available for ten days. The channel has therefore been designed to carry 750 cubic feet which should be sufficient for all requirements. At the head the bed width is ample, but lower down it varies considerably thus necessitating a considerable expenditure on earthwork for both cutting and banking. Details of the bed width and fall for the various reaches into which the channel has for convenience been divided are given in statement B. At the head the fall is proposed to be reduced to $\frac{1}{1500}$ in order to diminish the large quantity of sand which is now annually carried into the channel.

Area capable of being irrigated.—From statement A it appears that the channel now irrigates 5,632 acres. Statement C shows the proposed distribution of water to this area and to 366 additional acres proposed to be irrigated in future.

Main branch channels.—The carrying capacities and details of the main branch channels which supply tanks are shown in statement D. Channels which irrigate directly will as usual be left to the ryots to repair.

Cross drainage works.—In dealing with cross drainage works, the channel may be divided into 6 lengths according to the surplus works provided. The first length is from the head up to the proposed drop at 6,900 feet and the only flood water to be dealt with is the quantity received from the river which is said to rise to a maximum height of 8' 0" at the head of the channel. The resulting discharge is calculated to be about 2,300 cubic feet per second, of which 1,300 cubic feet per second are proposed to be discharged over the drop into the channel and the balance into the river over the proposed escape immediately above the drop. This is a large volume of flood water to take into the channel, but owing to the position of the head it is not considered advisable to construct a head sluice. With the arrangements proposed the flood water taken into the channel at the head can be easily and inexpensively discharged into the river by means of the paved escapes at 16,000 and 22,650 feet.

4. The second length of channel extends from the proposed drop up to the proposed paved escape at 16,000 feet. In this length of channel 1.300 cubic feet per second of flood water are received at the head over the proposed drop which with the Mullipullam and Thenkarai surplus channels (drainage about one square mile) and other cross drainages (about $1\frac{1}{4}$ square miles) brings the total quantity of flood water to be dealt with to about 2,200 cubic feet per second; of this quantity, 1,000 cubic feet per second will be discharged over the proposed escape at 16,000 feet with an average head of $2\frac{1}{2}$ feet, leaving 1,200 cubic feet per second to flow down the channel with a depth of 5 feet.

5. The third length is from the proposed escape at 16,000 feet up to Melakkal bridge and receives flood water from its own catchment basin from Thenkarai Periya Kanmoyi and Melakkal Periya Kanmoyi, amounting in all to an area of 6 square miles. The resulting maximum flood discharge from this area including 1,200 cubic feet per second in the channel is 2,850 cubic feet per second, the whole of which will be discharged into the river over the proposed paved bye-wash at 22,650 feet and through the vents of the surplus sluice immediately above the bridge. The bridge will be fitted with screw gearing shutters.

6. The fourth length of channel is from Melakkal bridge up to the proposed escape at 47,019 feet. As all flood water received by the channel above the bridge is proposed to be discharged into the river, the flood discharge in this length of channel is derived solely from a catchment basin of 3·5 square miles made up as noted in the margin and calculated to amount to 1,150 cubic feet per second; of this quantity, 500 cubic feet per second will be discharged into Madakkal channel over the proposed escape at 47,019 feet and the balance of 650 cubic feet will flow down the channel.

	SQ. M.
Catchment basin of channel up to 34,500 feet ... ... =	1·25
Karumbalodayavarsawmy Periya Kanmoyi surplus	0·17
Catchment basin of channel from 34,500 feet to Sivakulam branch channel head ... ... =	0·78
Catchment basin of Melamathur Periya Kanmoyi ... ... =	0·10
Catchment basin of Sivakulam, Udaikulam and Kakkayathu odai from the Nagamalai hills ... ... =	1·20
Total ...	3·50

7. The fifth length is from the proposed escape at 47,019 feet to the proposed escape at 58,210 feet, and in addition to 650 cubic feet per second received at the head the channel receives water from Madikattan Kanmoyi (catchment basin 0·6 square mile) and Nagamalai odai (catchment basin 0·55 square mile), making the total flood discharge 1,200 cubic feet per second. The whole of this quantity will be discharged into Madakkal channel at the proposed escape at 58,210 feet.

8. In the sixth length the catchment basin of the channel up to Pudukkóttai bridge is 0·6 square mile and below this point the channel receives the surplus from Vilacheri Periya Kanmoyi (catchment basin 3·7 square miles). The maximum flood discharge is 1,300 cubic feet per second which will be distributed between Nilaiyur channel and Palamkulam supply channel in the ratio of 3 to 2 corresponding to their sections. The estimated share of flood water to be carried by Nilaiyur channel is 790 cubic feet per second which with the surplus from Puliyankulam Kanmoyi (catchment

basin 0·8) will be discharged into Nilaiyur tank which will thus receive about 1,200 cubic feet per second of flood water.

9. *Masonry Works, &c.*—The first masonry work in the channel is the proposed escape and drop at 6,900 feet (plan No. 2). The escape is required to discharge into the river flood water received at the head of the channel.

10. The second masonry work (plan No. 3) is an existing escape at 8,392 feet which will be blocked up to the M.W.L. of the river in order to prevent river water entering the channel as, during a maximum flood, it is calculated that the river will rise to a higher level than the channel water.

11. The third work is a paved escape (plan No. 5) 225 feet long proposed to be constructed at 16,000 feet to discharge flood water into the river. It is calculated that this escape will during floods reduce maximum water level in the channel to 6″ above F.S.L.

12. The fourth work is a section wall (plan No. 6) and regulator proposed to be constructed at 18,299 feet at the head of Melakkal Periya Kanmoyi supply channel.

13. The fifth is a proposed paved escape (plan No. 8) 250 feet long at 22,650 feet to discharge flood water into the river and reduce M.W.L. in the channel to F.S.L. + 6 inches.

14. The sixth is an existing syphon at 26,348 feet carrying a portion of Melakkal field drainage under Nilaiyur channel to the river. The estimate provides for the necessary petty repairs.

15. The seventh (plan No. 11) is an existing escape at 27,350 feet which will be converted into a surplus escape of five vents each 6′ 0″ wide and worked by screw gearing.

16. The eighth is the existing Melakkal bridge at 27,578 feet (plan No. 12) carrying the road from Solavandan to Tirumangalam. It is in good order, but in order to prevent flood water from flowing down the channel will be provided with screw gearing shutters. Of the six vents, five will discharge into the main channel and one will be reserved as a head sluice to Kodimangalam Karumbalodayavarsawmy Periya Kanmoyi, the supply channel to which will be separated from the main channel in rear by a division wall.

17. The ninth is an existing aqueduct across the channel at 30,765 feet which being in bad order will be replaced by an iron pipe aqueduct (plan No. 13).

18. The tenth is a proposed inlet at 33,728 feet admitting the surplus of Karumbalodayavarsawmy Periya Kanmoyi into the channel. The estimate is included in the tank estimate (*vide* plan No. 32-C).

19. The eleventh is a proposed section wall and regulator at 34,970 feet at the head of Melamuthur Periya Kanmoyi supply channel (plan No. 14). The twelfth is a proposed section wall and regulator at 38,675 feet at the head of Sevakkulam Odai Kanmoyi supply channel (plan No. 14).

20. The thirteenth is a proposed inlet at 40,180 feet (plan No. 33-A) to admit surplus water from Melamathur Periya Kanmoyi.

21. The fourteenth is a proposed inlet at 46,550 feet to admit surplus from Kakkayuthu Odai and Madikattinan Kanmoyi. The work is included in the estimate for the tank (plan No. 35-A).

22. The fifteenth is a proposed outlet at 47,019 feet 80 feet long to discharge flood water into Madakkal channel (plan No. 17).

23. The sixteenth is a proposed outlet and regulator at 47,019 feet to divert the whole of the flood water from Nilaiyur channel into Madakkal channel (plan No. 22). The regulator will be built across the main channel to prevent flood water flowing down the channel.

24. The seventeenth is a proposed section wall and regulator (plan No. 14) at 61,400 feet at the head of Vadivelkarai Kanmoyi supply channel.

25. The eighteenth is an existing bridge of 2 spans each 12 feet wide on the Madura-Usilambath road at where it crosses the channel at 63,951 feet. The building is in good order.

26. The nineteenth is an existing syphon at 68,325 feet to pass Kilaneri Kanmoyi water and field drainage under the main channel. The work is in fair order.

27. The twentieth is an existing syphon at 69.525 feet to pass Vadivelkarai Kanmoyi water under the channel. The work is in fair order.

28. The twenty-first work is a syphon at 70,938 feet to pass Vadivelkarai Kanmoyi water under the channel. The work is in bad order and will be repaired.

29. The twenty-second is a proposed section wall across the main channel at 73,070 feet (plan No. 26).

30. The twenty-third is a proposed section wall at 78,580 feet (plan No. 26) at the head of Tangal Kanmoyi supply channel just below the existing regulator for head sluice.

31. The twenty-fourth is a proposed section wall across the channel at 81,865 feet below the head of Palamkulam branch channel (plan No. 26).

32. The twenty-fifth is a proposed section wall at 84,640 feet at the head of Samandakulam branch channel (plan No. 26).

33. The twenty-sixth is an existing bridge at 86,025 feet of 18 feet span on the road from Madura to Tirumangalam. It is in good order.

34. The twenty-seventh is an existing fishing anicut at 87,525 feet in good order.

35. *Sluices.*—There are 46 existing masonry sluices, 11 pot sluices and 5 irrigation cuts for direct irrigation from the channel. Of the 46 masonry sluices, 25 only will be retained, 3 which are in bad order will be replaced by pipe sluices, and 18 will be abandoned as the lands which they command can be irrigated from other sluices. Thirteen pipe sluices will also be provided in the place of the existing pot sluices and irrigation cuts. Details of these sluices are given in statement E.

36. *Earthwork.*—The channel will be cleared to the sections shown on plan and given in statement B. The rates allowed are according to the nature of the soil and lead and lift. The left bank up to cross section No. 77 will be raised to 3′ 0″ above M.W.L. of the channel or river whichever is highest with a 6′ 0″ top width and slopes $1\frac{1}{2}$ to 1 and 2 to 1 on the channel and river side respectively. Below cross section No. 77 up to Melakkal bridge the slopes will be $1\frac{1}{2}$ to 1 on both sides. Below the bridge the top will be 2′ 0″ above M.W.L. with a width of 5′ 0″ and side slopes $1\frac{1}{2}$ to 1 up to the bridge on the Madura-Tirumangalam road, below which point no banking is required as the channel is within the waterspread of Nilaiyur tank.

The Local Fund road from Madura to Usilambath runs over the left bank of the channel from 63,000 to 64,000 feet. The bank for this length will be given a top width of 15 feet with 6 inches of metal.

37. *Straight cut.*—The channel requires to be straightened for a short distance at the $3\frac{1}{4}$ milestone as shown on plan No. A. This straight cut is necessary as the water is eroding the bank.

38. *Branch channel.*—The estimates for improving branch channels have been included in those for the tank to which they give a supply.

39. *Emergent estimates.*—Emergent estimates to the extent of Rs. 1,400 have been included in the estimate. The work has already been executed.

40. *Compensation for land.*—A lump sum of Rs. 5,000 has been included in the estimate for compensation for such land as may be required and for earth in places where it has to be taken from patta lands.

41. *Mile and furlong stones.*—The main channel and some of the tanks have been provided with mile and furlong stones. Provision for replacing those which are missing is made in the estimate.

42. *Demarcation.*—Provision is made for demarcating the main and branch channels.

43. *Financial results anticipated.*—From statement A it appears that the proposed improvements and repairs to the channel will bring in an additional revenue of Rs. 4,000 or more than 5 per cent. on the estimated outlay. The work proposed to be done is therefore amply justified apart from the necessity of putting the channel into order so that the existing revenue may not be still further reduced.

44. *Estimates already sanctioned.*—Estimates amounting to Rs. 935 and Rs. 490 have already been sanctioned for the repair of No. 36 Savandekulam and No. 29 Ariyankulam, as these tanks were taken up before the investigation of Nilaiyur channel was completed.

45. The estimates as submitted by the Executive Engineer, No. I Party, Tank Restoration Scheme, amounted to Rs. 1,08,392, and as this amount was considered to be very excessive Overseer V. Aravamuthu Aiyangar of No. I Party was temporarily attached to the head office at Madras in order that the estimates might be entirely recast.

2nd April 1894.

(Signed) F. W. ASHPITEL,
for Chief Engineer for Irrigation,
Tank Restoration Scheme.

ENCLOSURE.

ABSTRACT estimate for Nilaiyur channel and its branches with connected tanks.

Number.	Name of work.	Original works. Amount.	Original works. Total.
	Main Channel.	RS.	RS.
1	Proposed drop No. 1 and escape No. 1 combined at 6,900 feet	6,550	
2	Existing escape at 8,392 feet	100	
3	Proposed paved escape No. 2 at 16,000 feet ...	400	
4	Proposed section wall and regulator at 18,299 feet.	500	
5	Proposed paved flush escape No. 3 at 22,650 feet ...	400	
6	Existing syphon sluice at 26,348 feet	50	
7	Converting existing escape at 27,350 feet into surplus sluice	3,400	
8	Adding regulator to existing road bridge at 27,578 feet	3,020	
9	Proposed iron pipe aqueduct at 30,765 feet in lieu of existing old work	410	
10	Proposed section wall and regulator at 34,970 feet.	280	
11	Do. do. at 38,675 feet.	280	
12	Proposed surplus escape No. 5 at left to be built at 47,019 feet	1,300	
13	Proposed regulator to channel and surplus escape No. 6 at left to be constructed at 58,210 feet ...	2,960	
14	Proposed section wall and regulator at 61,400 feet.	280	
15	Existing syphon No. 4 at 70,938 feet	100	
16	Proposed section wall at 73,070 feet	160	
17	Do. at 78,580 „	250	
18	Do. at 81,865 „	210	
19	Do. at 84,640 „	240	
20	Sixteen proposed stoneware pipe sluices	1,035	
21	Lump sum provision for repairs to 24 sluices and fixing missing mile and furlong stones and metalling road * for about 1,000 feet 12 feet wide and 6 inches deep	1,075	
22	Proposed means for regulation to road culvert for Melakkal lands direct cultivation at 27,578 feet.	70	
23	Channel cutting and banking the left bank of channel	20,700	
24	Compensation for land for main channel, branches and tanks	5,000	
25	Emergent estimates worked out	1,400	
	Demarcating the channel	920	
			51,090
	Melakkal Periya Kanmoyi branch supply channel and tank.		
1	Supply channel clearance	90	
2	Repairs to tank bund	260	
3	Do. to sluices 2, 3 and 4	90	
4	Proposed stoneware pipe sluice for sluice No. 1 of tank	70	
5	Improvements and extension to existing calingulah at right flank	250	
			760

* Road portion between 63,000 to 64,000 feet on longitudinal section.

Abstract estimate for Nilaiyur channel and its branches with connected tanks—*cont.*

Number.	Name of work.	Original works. Amount.	Original works. Total.
	Kodimangalam Karumbalodayavarsawmy Periya Kanmoyi supply channel and tank.	RS.	RS.
1	Supply channel clearance and banking ... ... Raising tank bund	800	
2	Repairs to sluices 1, 2 and 3	100	
3	Proposed surplus weir at right flank	490	
4	Extension of barrel of sluices 2 and 3 in rear to carry Local Fund road	* 260	
			1,650
	Melamathur Periya Kanmoyi supply branch channel and tank.		
1	Supply channel clearance and providing pot sluices for irrigation ... ... Raising tank bund	530	
2	Repairs to sluices 1 and 2	50	
3	Proposed surplus weir at right flank in main channel left bank	400	
			980
	Sevakkulam branch supply channel and tank.		
1	Supply channel clearance and strengthening left flood bank .. .. Providing three pot sluices in channel ... ... Raising tank bund	405	
2	Proposed rough stone calingulah at right flank ...	65	
3	Proposed stoneware pipe sluice for sluices 1 and 2.	110	
			580
	Madikattan Kanmoyi.		
1	Raising tank bund	645	
2	Proposed weir at left flank	670	
3	Proposed calingulah at right flank	190	
4	Proposed stoneware pipe sluice for sluices 1 and 2.	115	
			1,620
	Vadivelkarai Kanmoyi branch supply channel and tank.		
1	Supply channel clearance and strengthening left bank	215	
2	Providing five pot sluices in channel	25	
3	Repairs to road culvert	5	
4	Repairs to tank bund	785	
5	Repairs to sluices 1, 2 and 4	60	
6	Emergent estimate for closing breaches in tank bund	150	
7	Proposed sluice No. 3	340	
8	Proposed bye-wash at right flank end	50	
9	Improvements to existing calingulah at right flank.	180	
			1,810
	Kilaneri Kanmoyi branch supply channel and tank.		
1	Supply channel clearance ... ... Providing pot sluices in channel ... ... Raising tank bund	200	
2	Repairs to sluice in tank	30	
3	Improvements to road culvert	50	
4	Proposed rough stone calingulah at right flank ...	40	
			320
	Pudukulam Kanmoyi branch supply channel and tank.		
1	Providing two pot sluices in channel	10	
2	Raising tank bund	105	
3	Repairs to two sluices	50	
4	Providing a new stoneware pipe sluice in tank ...	45	
			210

* This amount of Rs. 260 is to be collected from the President, Madura Taluk Board (*vide* his letter No. 258, dated 3rd December 1892).

Abstract estimate for Nilaiyur channel and its branches with connected tanks—*cont.*

Number.	Name of work.	Original works. Amount.	Original works. Total.
	Vilacheri Kanmoyi branch supply channel and tank.	RS.	RS.
1	Supply channel clearance	115	
2	Supply channel banking	35	
3	Repairs to escape in channel	20	
4	Repairs to head sluice in channel	40	
5	Raising tank bund	920	
6	Repairs to sluices in tank	150	
7	Extensions to calingulah at right flank	185	
8	Proposed paved byewash at right flank	55	
			1,520
	Puliyangulam supply branch channel and tank.		
1	Section wall across supply channel	183	
2	Raising tank bund and channel bank	560	
3	Proposed pavement at right flank	27	
			770
	Palamkulam branch supply channel and tank.		
1	Supply channel clearance ... ... Supply channel left bank raising	630	
2	Section wall in channel	180	
3	Repairs to supply sluice in channel	25	
4	Repairs to existing syphon sluice in channel ...	30	
5	Extension to existing road culvert across supply channel	280	
6	Improvements to the existing dividing dam in channel at end	210	
7	Raising tank bund	310	
8	Repairs to tank sluices	60	
9	Proposed paved byewash at right flank end of tank	55	
			1,780
	Samandakulam branch supply channel and tank.		
1	Supply channel clearance	95	
2	Improvements to road culvert across supply channel.	150	
3	Raising tank bund	240	
4	Proposed new sluices 1, 3 and 4	190	
5	Providing rear cistern to sluice 2	55	
			730
	Nelaiyur Kanmoyi.		
1	Raising tank bund	1,160	
2	Rebuilding revetment to tank bund	3,200	
3	Repairs to calingulah No. 1	30	
4	Extensions and improvements to calingulah No. 2.	1,260	
5	Proposed tower head to sluice 2	500	
6	Do. do. 3	290	
			6,440
	Total ...		70,260
	Deduct amount to be recovered from Taluk Board, Madura, for extending tunnels of sluices 2 and 3 in Karumbalodayavarsawmy Periya Kanmoyi to carry Local Fund road passing along the rear toe of the bund (*vide* letter No. 258 of 3rd December 1892 from President, Taluk Board) ...		260
	Net amount of estimate ...		70,000

(Signed) F. W. ASHPITEL,
for Chief Engineer for Irrigation,
Tank Restoration Scheme.

From M.R.Ry. M. TILLANAYAGAM PILLAI, Avergal, President, Taluk Board, Madura, to the Executive Engineer, No. I Party, Tank Restoration Scheme, dated 3rd December 1892, No. 258.

With reference to your foot-note No. 423 M., dated 30th November 1892, to letter No. 538, dated 30th November 1892, from the Overseer, No. I Party, Tank Restoration Scheme, I have the honour to state that I want to take the road at the slope of the bund and the barrels of the sluices will of course have to be extended. I have been thinking of applying to you for an estimate for extending the barrels of the sluices and for building new cisterns and shall feel obliged if you will favour me with an estimate for the same. The cost of extension of the barrel and constructing a new cistern will be borne by the Local Board. If you will allow me I shall have the work executed under the supervision of the Local Fund overseer.

Office-note to the Examiner of Public Works Accounts, dated 10th April 1894, No. 95.
„ from „ „ „ 1st May „ „ 1664.

No. 88 I.

Submitted to Government with a recommendation that the estimates amounting to Rs. 70,260 be sanctioned.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

7th May 1894.

ORDER—dated 24th July 1894, No. 537 I., Public Works.

The estimates aggregating Rs. 70,260 for the restoration of the Nilaiyur channel and its branches with connected tanks in the Madura division are sanctioned, Rs. 260 of the proposed outlay being met by the Local Fund Board, Madura.

2. This sanction is registered as No. 56 I. of 1894–95 and classified as shown below:—

Irrigation.
43. Minor Works and Navigation.
Minor Works for which neither Capital nor Revenue Accounts are kept, P.W.D.
Madura Division.
Original Works.

	RS.
Restoring Nilaiyur channel and its branches with connected tanks...	70,260

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, VI Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.
„ Local and Municipal Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 24th.

Recd. *Encl.*

G.O., 24th July 1894, No. 537 I.

JULY.

Nilaiyur Channel

Estimates aggregating Rs. 70,260 for restoring the — and its branches with connected tanks in the Madura division, sanctioned with remark.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

From A. H. GARRETT, Esq., Superintending Engineer, I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 7th July 1894, No. 395 G.N.

With reference to your memorandum No. 11 G.N., dated 12th March 1894, I have the honour to submit herewith an estimate, amounting to Rs. 79, for repairs and carriage of tools and plant for March 1894 received from the Executive Engineer in charge of Rushikulya division and to request that you will be good enough to obtain the sanction of Government to the same.

ORDER—dated 24th July 1894, No. 538 I., Public Works.

The estimate submitted with the foregoing letter is approved.

2. The formal sanction of Government thereto should be applied for from the amount provided to meet unforeseen demands under Tools and Plant in the revised estimate for the Rushikulya project submitted in Proceedings of the Madras Government, No. 13 I., dated 10th January 1894, for the sanction of the Government of India as soon as that sanction is communicated to the Superintending Engineer, I Circle.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, I Circle, with estimate.
„ Examiner, Public Works Accounts.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 24th.

Recd. *Encl.*

G.O., 24th July 1894, No. 533 I.

JULY.

Tools and Plant

Estimate of Rs. 79 for repairs and carriage of — for March 1894, Rushikulya division, approved, and formal sanction thereto ordered to be applied for on receipt of the Government of India sanction to the revised estimate for the project.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

From S. D. PEARS, Esq., Superintendent of Works, No. I Periyár Division, to the Chief Engineer, Public Works Department, dated Periyár, 14th July 1894, No. 80 C.E.

I have the honour to forward the undermentioned estimates for approval :—

		RS.
(1)	Purchasing 100 cast steel drills, estimate	1,150
(2)	Do. 100 watering cans	325
(3)	Do. spare jaws from Cossipore	745

2. The steel drills were obtained from England on indent sanctioned in G.O., No. 3112 W., dated 2nd December 1893.

ORDER—dated 25th July 1894, No. 548 I., Public Works.

The estimates submitted with the foregoing letter are approved.

2. The formal sanction of Government thereto should be applied for from the amount provided for further outlay under Tools and Plant in the revised estimate for the Periyár project submitted in Proceedings of the Madras Government, No. 97 I., dated 3rd February 1894, for the sanction of the Government of India as soon as that sanction is communicated to the Superintendent of Works, No. I Periyár Division.

(True Extract.)

(Signed) J. PENNYCUICK, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
" Superintendent of Works, No. I Periyár Division, with three enclosures.
" Examiner, Public Works Accounts.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 25th.

Recd. **Encl.**

G.O., 25th July 1894, No. 548 I.

JULY.

Tools and Plant

Estimates for the purchase of certain — for No. I Periyár Division, approved, and formal sanction thereto ordered to be applied for on receipt of the Government of India sanction to the revised estimate for the project.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

Read—the following papers :—

No. 73 C.E.

Progress Report for the recess of 1894.

General.—The recess under review began of necessity some weeks earlier than usual on account of the epidemic of cholera referred to in the last report, which culminated on the 9th March in the stoppage of all work at Periyár. A small handful of coolies were all that remained on that date, among whom cholera still continued, slowly abating, till the 21st March when the last case occurred. The dam having been left in a condition ill-prepared for the monsoon floods, arrangements were made for the collection of labour to rebuild the camp on a new site and for the carrying out of such work as was necessary to secure the dam from harm in the June floods. Work had hardly been resumed when a fresh epidemic of cholera sprang up from a freshly imported case on the 20th April. This proved, however, to be of considerably less severity than the former attack and work in general was not appreciably affected by it. At the end of May a few cases also appeared at Thekady, but did not spread to the extent of an epidemic. During the recess under review was also noticeable for the first time a feature which may possibly affect the future progress of the work and is therefore perhaps worth mentioning—a most offensive smell from the water of the lake perceptible occasionally at a distance of 200 yards. That this is due to the decay of the vegetable matter submerged by the rise of the lake, there can be little doubt and it is matter for reasonable apprehension that as the waterspread increases and with it the amount of decayed vegetable matter held in suspension, the health of the camp may be seriously affected by it, the more so as the Periyár water is at all times the principal source of water-supply for both washing and drinking. The Kullars were again troublesome during the recess and on the 11th June effected a robbery of explosives from the Periyár magazine, amounting in value to three or four hundred rupees. The matter was very promptly reported to the Police by the sub-overseer in charge, but their investigations have at present been unsuccessful.

Health.—The hospital statistics for the four recess months are subjoined. They are not, however, an accurate measure of the prevalent sickness, for not only was the hospital very naturally shunned while the majority of its inmates were cholera patients, but there were no less than four changes of apothecary during the four months, each one in turn being compelled by fever to leave the hills and, while in charge, to pay more attention to his own health than to that of his patients.

The Thekady camp was officially abolished on the 31st March and with it the Thekady dispensary.

Camp.	Month.	Average population.	Daily average attendance.	Total treated.	Ratio sick to 1,000 of population.	Deaths.	Ratio death to 1,000 of population.
Periyár	March	994	34·33	684	688·12	36	36·21
	April	818	32·15	507	619·80	15	18·33
	May	1,430	37·34	722	504·89	10	6·99
	June	1,444	86·72	1,150	796·39	4	2·77
Thekady	March	447	17·70	303	677·85	2	4·47

Rainfall.—The rainfall for the four months at Periyár and at Thekady was as follows, the average of each month for five previous years being also shown :—

—		March.	April.	May.	June.
Periyár	1894	3·51	6·69	1·98	14·04
	Average	1·82	5·79	3·59	9·56
Thekady	1894	4·15	3·50	3·20	5·90
	Average	1·83	4·66	2·64	6·88

Main Dam.—The small amount of labour present during the four months was mainly employed on collection of materials for the present season's work and in rebuilding the camp on a new site uninfected by cholera. The stocks of the three principal materials, stone, limestone and sand, were increased from 139,000 cubic feet to 300,000 cubic feet from 54,500 cubic feet to 97,588 cubic feet and from 53,463 parrahs to 74,749 parrahs respectively. On the dam itself 35,443 cubic feet of concrete and 36,417 cubic feet of rubble were put in in addition to the 17,543 cubic feet already reported in March. This included the completion of the masonry chamber in connection with the sluice at R. flank of the dam and the raising of the front skin wall to R. L. + 80 for a length of about 300 feet from the R. flank.

Left Bank Escape.—No progress was made on this work, and the excavation of foundations remains about three-fourths finished.

Water-shed Cutting.—This work at Thekady not being interfered with by cholera or other impediment was steadily proceeded with and brought to completion by the end of May. It will for the future serve as a navigation canal. A wall was built across the S. mouth of the water-shed tunnel with a view to retaining the water in the cutting for navigation after the expected completion of the tunnel in September.

Water-shed Tunnel.—No advance was attempted with this work for the reasons given in the last report. The short length of tunnel between its S. entrance and the semi-circular sluice tunnels was blasted out to full section and the plant at foot of the abandoned No. 2 shaft was removed. Up to the 30th June water had not risen to a sufficient height in the reservoir to permit resumption of work at the N. end.

Buildings, Minor Works and Maintenance.—The new cooly camp at Periyár was nearly completed during the recess together with the latrines, drains and foot-paths in connection with it. At the end of June accommodation for about 3,000 coolies was available. A foot-bridge across the Periyár river to connect the new camp with the shops, the hospital, the rice bazaar, the Magistrate's cutcherry, &c., which necessarily remain on their former sites on the right bank of the river, was also begun and the masonry piers completed. New maistries' and carpenters' lines were also built, and the permanent buildings which could not be removed to the L. bank were repaired. New police lines for the extra force recently sanctioned were nearly completed. Nearly all the more important plant, floating, rolling and fixed, was overhauled and repaired and the road and canal maintained in good order.

(Signed) S. D. PEARS,
Supdt. of Works, No. I Periyár Division.

12th July 1894.

To the Chief Engineer,
Public Works Department, Madras.

Note by the Chief Engineer, Public Works Department.

Submitted for the information of Government.

2. The only point requiring special notice is the offensive smell from the water of the lake. It is hardly correct to say that this was noticeable for the first time during the recess under review; it was very noticeable indeed when I visited the works in February though no doubt it got worse as the weather got hotter.

3. It will probably decrease as the discharge of the river increases, and I doubt its producing any serious effect on the health of the camp.

OOTACAMUND,
19th July 1894.

(Signed) J. PENNYCUICK, Colonel, R.E.,
Chief Engineer, P.W.D.

ORDER—dated 26th July 1894, No. 551 I., Public Works.

Recorded and forwarded to the Government of India.

[Here enter No. 552 I., dated 26th July 1894.]

(True Extract.)

(Signed) J. PENNYCUICK, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintendent of Works, No. I Periyár.
„ Chief Engineer for Irrigation.
„ Revenue Department.

ENDORSEMENT—dated 26th July 1894, No. 552 I., Public Works.

Forwarded.

(By Order.)

(Signed) J. PENNYCUICK, Colonel, R.E.,
Secretary to Govt., P.W.D.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 26th.

Recd. *Encl.*

G.O., 26th July 1894, Nos. 551, 552 I.

JULY.

Periyar Works

Forwarding Proceedings recording progress report of the — for the recess of 1894.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

From the Executive Engineer, Nellore Division, to the Superintending Engineer, II Circle, dated 14th March 1894, No. 549.

I have the honour to request you will obtain the sanction of Government for the transfer of the three tanks entered in the enclosed list from the charge of the Revenue Department to that of the Public Works Department.

The works will be numbered when the list of irrigation works of the Nellore district which is now under revision is completed.

No. 842 N.L.

Forwarded to the Chief Engineer for Irrigation for favour of obtaining the sanction of Government for the transfer of the tanks from the charge of the Revenue Department.

(Signed) J. W. MARTIN,
Suptg. Engineer, II Circle.

22nd March 1894.

No. 89 I.

Submitted to Government with a recommendation that the following additions be made in the list of "Minor Works for which neither Capital nor Revenue Accounts are kept, P.W.D.," Nellore district, communicated with G.O., No. 407 I., dated 6th July 1887 :—

Taluk.	Corresponding number on the map.	Source of supply.	Name of group or system.	Name of channel.	Name of tanks.	Present irrigation.		Total.	
						Area.	Revenue.	Area.	Revenue.
						ACS.	RS.	ACS.	RS.
Udayagiri ..	246	Rain-fed ..	Isolated ..	..	Totalacheruvupalli tank.	286	1,577	286	1,577
Kávali ..	247	..	..	Narella-vagoo.	Chamadala ..	298	1,750	392	1,893

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

4th July 1894.

ORDER—dated 26th July 1894, No. 553 I., Public Works.

The proposal of the Chief Engineer for Irrigation is approved.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, II Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 26th.

Recd. *Encl.*

G.O., 26th July 1894, No. 553 I.

JULY.

Tanks

The proposal of the Chief Engineer for Irrigation to add the Totalacheruvupalli and Chamadala tanks to the list of "Minor Works for which neither Capital nor Revenue Accounts are kept, P.W.D.," Nellore district, approved.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From A. H. GARRETT, Esq., Superintending Engineer, I Circle, to the Chief Engineer for Irrigation, dated Dowlaishweram, 12th July 1894, No. 446 G.N.

I have the honour to submit herewith an estimate, amounting to Rs. 130, for 25 steel jumpers required for use in the Rushikulya division, and to request that you will be good enough to obtain the sanction of Government to the same.

2. Out of 40 jumpers supplied from Public Works Stores in April 1894 and sanctioned in G.O., No. 332 I., dated 11th April 1894, the Executive Engineer reports that 20 jumpers were issued to Russellkonda sub-division and 20 to Suradá sub-division for the use of rock cuttings on Gulleri channel and Padmapur respectively.

3. The 25 jumpers now indented for are for the use of rock cutting, Rushikulya canal, and they are urgently required.

4. The rates in the estimate are approximate.

5. Should the estimate meet with your approval, I beg you will kindly transmit the enclosed indent to the General Superintendent, Public Works Stores, for compliance.

Order—dated 27th July 1894, No. 554 I., Public Works.

The estimate submitted with the foregoing letter is approved.

2. The formal sanction of Government thereto should be applied for from the provision made for meeting unforeseen demands for tools and plant in the revised estimate for the Rushikulya project submitted in Proceedings of the Madras Government, No. 13 I., dated 10th January 1894, for the sanction of the Government of India as soon as that sanction is communicated to the Superintending Engineer, I Circle.

3. The indent received from the Superintending Engineer will be forwarded to the General Superintendent, Public Works Stores, for compliance.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, I Circle, with estimate.
" " V " with indent.
" Examiner, Public Works Accounts.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras

PUBLIC WORKS.

Dated July, 27th.

Recd. *Encl.*

G.O., 27th July 1894, No. 554 I.

JULY.

Steel Jumpers

Estimate for the purchase of 25 — for use in the Rushikulya division, approved with remarks, and the indent for the same forwarded to the General Superintendent, Public Works Stores, for compliance.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.

READ—the following paper :—

From Major O. V. BODDY, R.E., Superintending Engineer, VI Circle, to the Chief Engineer for Irrigation, dated Trichinopoly, 18th July 1894, No. 632 T.C.

Under paragraph 78, chapter IX of the Public Works Code, I have the honour to request the sanction of Government for execution by this department of the under-mentioned contribution works :—

	RS.
(1) Repairing and re-opening the sluice next to No. 3 Ponnary branch channel	100
(2) Repairing and re-opening the sluice next to No. 4 Ponnary branch channel	100

in Solamadavi limits in the Udayárpálaiyam taluk, Trichinopoly district.

2. These are the old abandoned sluices closed about two years ago, as the extent of irrigation, about 60 acres under each of the sluices, was commanded by the said branch channels. But while this arrangement was highly desirable as regards the general good of the main channel itself, it did not meet the wishes of the ryots concerned who want to have separate sluices for their lands and with that view to have those in question repaired and re-opened. In this request they are supported by the Revenue Department.

3. The plans and estimates have been approved by the Collector, and the ryots concerned have paid into the treasury the full amount of contribution, Rs. 249, that is Rs. 200, estimated cost of works, and Rs. 49, the prescribed centage for establishment and tools and plant.

ORDER—dated 27th July 1894, No. 555 I., Public Works.

The execution by the Public Works Department of the works referred to is sanctioned.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, VI Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.

IRRIGATION.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 27th.

Recd. *Encl.*

G.O., 27th July 1894, No. 555 I.

JULY.

Contribution Works

The execution by the Public Works Department of the — of repairing and re-opening certain sluices of Ponnary branch channel, Trichinopoly district, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following paper :—

From Major O. V. BODDY, R.E., Superintending Engineer, VI Circle, to the Chief Engineer for Irrigation, dated Trichinopoly, 2nd July 1894, No. 401 M.D.

I have the honour to submit, for your approval and sanction of Government, a revised estimate amounting to Rs. 6,020, together with comparative statement, for extending the anicut across Vyravanar and constructing a head sluice to the channel therefrom in the Periyakulam taluk, Madura district.

2. An estimate, amounting to Rs. 5,430, was sanctioned in G.O., No. 559 I., dated 19th June 1893, and the amount has been allotted in the current year's budget. In the sanctioned estimate Rs. 30 and Rs. 28–8–0 per 100 cubic feet were allowed for "burnt stone in surki mortar" and "burnt stone in ordinary mortar," respectively; it is now found that these rates are very low and that an increase of Rs. 10 for burnt stone work is necessary, or that the above rates should be raised to Rs. 40 and Rs. 38–8–0, respectively, under the circumstances stated below. This increase causes an excess of Rs. 590 over the sanctioned or original estimate.

3. The work in question is situated at Kuruvanutha at foot of the Periyár hills in the Cumbum valley in an entirely feverish locality where labour is very scarce and cannot be easily procured. No contractor would therefore tender for the work, though tenders were invited for nearly one month, and the only one who agreed to take up the work declined to do so at the sanctioned rate for stone work. Considering the difficulties and the locality, the rates now proposed appear reasonable.

4. The estimate is recommended for early sanction in order that the work may be put in hand without further delay, its early completion being of great importance, as until this is done Periyár water cannot be let down.

ORDER—dated 30th July 1894, No. 558 I., Public Works.

The following revised estimate is sanctioned in lieu of the estimate of Rs. 5,430 sanctioned in G.O., No. 559 I., dated 19th June 1893 :—

Irrigation.
43. Minor Works and Navigation.
Minor Works for which neither Capital nor Revenue Accounts are kept, P.W.D.
Madura Division.
Suruliyár Minor Basin.
Original Works.

	RS.
Extending the anicut across Vyravanar and constructing a head sluice to the channel therefrom, estimate	6,020

2. This sanction is registered as No. 57 I. of 1894-95.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, VI Circle, with five enclosures.
" Examiner, Public Works Accounts.
" Revenue Department.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 30th.

Recd. *Encl.*

G.O., 30th July 1894, No. 558 I.

JULY.

Vyravanar Anicut

Revised estimate of Rs. 6,020 for extending the — and constructing a head sluice to the channel therefrom, Madura division, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper:—

From S. D. PEARS, Esq., Superintendent of Works, No. I Periyár Division, to the Chief Engineer, Public Works Department, dated Periyár, 14th July 1894, No. 78 C.E.

I have the honour to submit herewith, for the sanction of Government, an estimate, amounting to Rs. 5,440, for the maintenance and repairs of the A. wire ropeway for 1894–95.

2. The sums allowed for most of the items are necessarily approximate only, but as they have only been assessed after careful reference to the expenditure in former years and examination of the probable requirements of the present season, I beg that they may be accepted and passed.

Order—dated 30th July 1894, No. 559 I., Public Works.

The estimate submitted with the foregoing letter is approved.

2. The formal sanction of Government thereto should be applied for from the amount provided for further outlay under Tools and Plant in the revised estimate for the Periyár Project submitted in Proceedings of the Madras Government No. 97 I., dated 3rd February 1894, for the sanction of the Government of India as soon as that sanction is communicated to the Superintendent of Works, No. I Periyár Division.

(True Extract.)

(Signed) J. PENNYCUICK, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Chief Engineer for Irrigation.
,, Superintendent of Works, No. I Periyár Division, with estimate.
,, Examiner, Public Works Accounts.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 30th.

Recd. *Encl.*

G.O., 30th July 1894, No. 559 I.

JULY.

Wire ropeway, No. I Periyar Division

Estimate for the maintenance and repairs of the A. — for 1894-95, approved with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From Major W. L. C. BADDELEY, R.E., Superintending Engineer, II Circle, to the Chief Engineer for Irrigation, dated Bezwada, 20th July 1894, No. 915 K.S.

With reference to your memorandum No. II/98 K.S., dated 18th June 1894, I have the honour to forward herewith a statement showing the current year's grants for the Kistna district for original works, repairs and special tools and plant under all heads distributed between the three divisions of the district.

Enclosure.

Statement showing the current year's grants for the Kistna district under Irrigation for original works, repairs and special tools and plant.

Description.	Grants for 1894–95.			Total for the district.
	Kistna Eastern Division.	Kistna Northern Division.	Kistna Western Division.	
49. Irrigation.	RS.	RS.	RS.	RS.
Capital expenditure not charged to Revenue.				
Land	12,960	..	7,078	20,938
Other sub-heads	75,800	6,200	1,36,569	2,18,569
Total, Works	88,760	6,200	1,43,647	2,38,607
Tools and plant	..	..	5,000	5,000
42. Major works (working expenses).				
1. Extensions and improvements	7,650	350	2,000	10,000
2. Maintenance and repairs	90,662	19,338	87,528	1,97,528
5. Tools and plant	800	35,200	4,000	40,000
43. Minor works and Navigation.				
Minor works for which Capital and Revenue Accounts are kept.				
Works including compensation.				
Capital Account.				
Dondapad tank project	..	33,239	..	33,239
Muniyeru project	..	20,325	..	20,325
Minor works for which neither Capital nor Revenue Accounts are kept, P.W.D.				
Original works (Tank Restoration works)	..	..	15,000	15,000
Repairs—Ordinary works	4,000	..	3,000	7,000
Do. Tank restoration works	..	..	12,000	12,000
Agricultural River Embankments.				
Major Original works	8,000	..	..	8,000
River Conservancy.				
Repairs	1,000	1,000	10,000	12,000
River Embankments.				
Repairs	5,700	300	7,000	13,000

Order—dated 31st July 1894, No. 560 I., Public Works.

The statement appended to the foregoing letter showing the distribution of the current year's grants for the Kistna district for original works, repairs and special tools and plant under all heads between the three divisions of the district as reconstituted in G.O. No. 778 W., dated 20th March 1894, is approved.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, II Circle.
" Examiner, Public Works Accounts.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 31*st*.

Recd. *Encl.*

G.O., 31st July 1894, No. 560 I.

JULY.

Grants for the Kistna District

Statement of distribution of the current year's — for original works, repairs and special tools and plant under all heads between the three divisions of the district, approved.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From H. M. WINTERBOTHAM, Esq., Collector of Tanjore, to the Superintending Engineer, V Circle, dated Vallam, 29th June 1894, No. 1531-Ver.

With reference to your foot-note, dated 14th April 1894, No. 120 M., I have the honour to forward herewith in original a letter from Monsieur L'Administrateur Principal à Karikal, dated 28th June 1894, No. 181, according his consent to the construction of screw shutters in the three central arches of the bridge at the head of the Kodamurti as proposed in the plans and estimates herewith returned.

Enclosures.

From Monsieur T. TROUPEL, Administrateur Principal à Karikal, to the Collector of Tanjore, dated Karikal, the 28th June 1894, No. 181.

J'ai l'honneur de vous faire retour du dossier ci-joint relatif à l'établissement de vannes à écrou dans les trois arches centrales du pont existant à la prise d'eau de Codamourty dans le Cavéry, dossier qui était joint à votre letter en date du 8 Mai dernier, No. 1893.

Ce projet, dont il a été question depuis plusieur années, ayant pour but de donner plus d'eau au Cavéry et à l'Arselar, nous n'avons aucune objection à présenter au sujet des plans dont nous avons demandé la communication, étant donnè surtout que les riviéres Mouvicondanar, Tirmalrassanar et du bras secondaire du Codamourty, ne suffiront en rien de cette réduction d'eau qu'elles reçoivent en excès au détriment de l'Arselar, qui en a le plus grand besoin.

Il reste bien entendu que ce projet serait modifié s'il ne réalisait pas les améliorations désirées, sans nuire aux trois cours d'eau alimentés par la prise d'eau de Codamourty.

Du reste, la pose de vannes mobiles permettrait d'augmenter à volonté le débit de la prise d'eau de Codamourty, si le besoin s'en faisait sentir.

Veuillez agréer, Monsieur le Collecteur, l'assurance de ma considération trés distinguée.

Report to accompany the estimate for providing screw shutters for the Kodamurti regulator.

This, as at present arranged, is simply a bridge of 11 arches of 34 feet span with four small arches of 14½ feet span; each of the latter are divided into two vents which are closed with needle shutters.

2. The floor under the bridge is arranged in steps as shown by the accompanying tracing which also shows the Cauvery branch.

3 Up a level of 3 feet above lowest floor the relative areas of water-way are Cauvery 1,088 square feet, Kodamurti 544 square feet, the cultivation under each river being Cauvery 373,779 acres, Kodamurti 125,844 acres.

4. The Kodamurti draws off far more than its share of the water (as proportioned for irrigation) during low stages of the river, *e.g.*, when the Cauvery receives half supply the Kodamurti draws off 1⅓ its requirements and when the Cauvery receives a full supply the Kodamurti draws off three times its requirements.

5. As will be seen from the accompanying copy of a letter from the Chief Engineer of the French territory, they no longer have any special objection to a re-arrangement of the distri-

bution under the two rivers, in fact it would be greatly to their advantage were it possible to send an increased supply down the Cauvery from which the Arisalar supply alluded to by the French Engineer is derived.

6. To provide means of doing so, it is proposed to fit the three low level arches of the Kodamurti dam with screw shutters (*vide* this office No. 345 E.I. of 25th October 1893 to Chief Engineer for Irrigation).

Each arch of 34 feet span will be fitted with two shutters of 17 feet in length (exact lengths 16′ 11″) and 2 feet in height.

These shutters will be supported (not at the ends) at points 3 feet from each end by vertical rails on which they will slide up and down, being kept in position by L iron friction strips riveted to them as shown. The vertical rails will be secured at foot, in the floor, by concrete and will be anchored to the face of the arch at top by iron stirrups, screwed to bolts, let into the arch; in front of each shutter will be placed corresponding vertical rails; these will keep the shutters in position, but they are chiefly intended for pillars to support the longitudinal beam at top; this latter will support the capstan nuts and friction plates, while on the inner side they will bear on slab stones let into the arch.

To form a platform the bridge parapet must be moved back 2½ feet, reducing the width of bridge road-way to 15½ feet quite enough for a double line of traffic. Each shutter will be worked by two 2½-inch screws with capstan nuts coupled together as at the Cauvery and Vennar regulators (for details see Mullin's manual). As the front rails will have to carry a certain amount of vertical load, light diagonal bracing of T iron has been provided as shown on the elevation. To support the ends of the longitudinal girder (a rolled steel joist 5″ × 4½″, weight 23·75 lb. per foot) it will be necessary to carry up an 18″ wall on the cut waters.

7. In this office No. 345 E.I. of 25th October 1893 to Chief Engineer for Irrigation, it was proposed to also fit shutters 1 foot in height to the arches on right and left of the 14½-foot arches, but as this would only control 68 square feet of water-way, it is not now proposed to do so until the result attained by control of the three low level arches has been ascertained.

(Signed) J. C. LARMINIE,
Suptg. Engineer, V Circle.

1st March 1894.

No. 258 E.I.

Submitted to the Chief Engineer for Irrigation with reference to his memorandum No. V./35 T.J., dated 4th April 1894, with request that early sanction may be given to the estimate and funds allotted for the execution of the work in the current year.

(Signed) J. C. LARMINIE,
Suptg. Engineer, V Circle.

7th July 1894.

Order—dated 31st July 1894, No. 561 I., Public Works.

The following estimate is sanctioned:—

Capital Expenditure not charged to Revenue.
49. Irrigation.
Cauvery Delta System.
Open Capital Account.
(2) Main Canals and Branches.
3. Regulators.
Unremunerative Work.
Providing screw gearing shutters for the three central arches of Kodamurti regulator.

	RS.
I. Works ...	2,730
II. Establishment ...	628
III. Tools and plant ...	42
Total estimate ...	3,400

2. This sanction is registered as No. 58 I. of 1891–95 and will expire on the 31st March 1896.

3. There are no funds available at present to allot to the work, the execution of which can well lie over till next official year or until the financial pressure is over.

4. Ordered that a copy of these Proceedings be forwarded to the Government of India for information.

[Here enter No. 562 I., dated 31st July 1894.]

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, V Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.
„ Political „

Endorsement—dated 31st July 1894, No. 562 I., Public Works.

Forwarded.

(By Order.)

(Signed) R. R. E. DRAKE-BROCKMAN, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 31st.

Recd. *Encl.*

G.O., 31st July 1894, Nos. 561, 562 I.

JULY.

Kodamurti Regul ator

Forwarding Proceedings sanctioning with remarks estimate of Rs. 3,400 for providing screw gearing shutters for the three central arches of —, Cauvery delta system.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following paper :—

From Major O. V. BODDY, R.E., Superintending Engineer, VI Circle, to the Chief Engineer for Irrigation, dated Trichinopoly, 1st July 1894, No. 299 T.N.

I have the honour to submit, for your approval and sanction of Government, a revised estimate, amounting to Rs. 1,440, for raising the crest of the Srívaikuntam anicut in the Tenkarai taluk, Tinnevelly district.

2. An estimate, amounting to Rs. 1,150, was sanctioned in G.O., No. 232 I., dated 12th March 1894 ; in that estimate Rs. 13 were allowed for concrete stone jelly in surki mortar per 100 cubic feet. This rate does not include the wooden frame work inside which the concrete has to be rammed ; it is therefore considered insufficient. In the present estimate Rs. 275 have been provided to meet the cost of frame work necessary ; hence the excess over the former estimate.

Enclosure.

Report to accompany revised estimate for raising the crest of Srívaikuntam anicut.

	RS.
Amount of original estimate	1,150
Do. of revised do.	1,440

In the original estimate for this work no provision was made for wooden frame work inside which the concrete has to be rammed and the rate allowed, Rs. 13, is insufficient. In this estimate a sum of Rs. 275 has been provided to meet the cost of frame work necessary.

(Signed) C. W. WOOD,
Executive Engineer.

27th June 1894.

No. 93 I.

Submitted to Government. The amount of the revised estimate forwarded by the Superintending Engineer has been increased in this office from Rs. 1,440 to Rs. 1,890, it being considered desirable for greater strength to provide for plastering the concrete wall with Portland cement, which, to ensure good work, should be done by departmental agency.

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

20th July 1894.

Order—dated 31st July 1894, No. 564 I., Public Works.

The following estimate is sanctioned in supersession of the estimate of Rs. 1,430 sanctioned in G.O., No. 232 I., dated 12th March 1894 :—

Capital Expenditure not charged to Revenue.
49. Irrigation.
Srívaikuntam Anicut System.
Open Capital Account.
1. Head Works.
3. Works.
Remunerative Work.
Raising the crest of the Srívaikuntam Anicut.

	RS.
I. Works	1,890
II. Establishment	435
III. Tools and Plant	25
Total ...	2,350

2. This sanction is registered as No. 59 I. of 1893–94 and will expire on 31st March 1896.

3. Ordered that a copy of these Proceedings be forwarded to the Government of India for information.

[Here enter No. 565 I., dated 31st July 1894.]

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, VI Circle.
„ Examiner, Public Works Accounts.
„ Revenue Department.

Endorsement—dated 31st July 1894, No. 565 I., Public Works.

Forwarded.

(By Order.)

(Signed) R. R. E. DRAKE-BROCKMAN, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

IRRIGATION.
ACCOUNT.

Govt. of {1894} Madras.

PUBLIC WORKS.

Dated July, 31st.

Recd. *Encl.*

G.O., 31st July 1894, Nos. 564, 565 I.

JULY.

Srivaikuntam Anicut

Forwarding Proceedings sanctioning, with remarks, revised estimate of Rs. 2,350 for raising the crest of the —, Tinnevelly division.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

TABULAR STATEMENT OF MISCELLANEOUS PROCEEDINGS AND MATTERS OF ROUTINE.

IRRIGATION.

FOR THE MONTH OF JULY 1894.

Subjects.	Number and Date of Order.	Numbers and Dates of previous Orders.
Land.—Notification for the acquisition of — required for the Gundur tank, Chingleput taluk, ordered to be published in the *Fort St. George Gazette and the grant of another* piece of land in exchange, sanctioned.	2nd July 1894, No. 501 I.	......
Land.—Notification for the acquisition of — required for the Rushikulya project, Ganjám division, ordered to be published in the *Fort St. George Gazette.*	2nd do. do. No. 502 I.	4th Sept. 1890, Nos. 482–83 I.
Objectionable items statement.—Orders on — for March 1894 for the II Circle.	2nd do. do. No. 503 I.	8th June 1894, No. 441 I. 7th May 1894, No. 373 I. 11th April 1894, No. 333 I. 27th Feb. 1894, No. 184 I.
Irrigation works in Baluchistan.—Government of India review of the revenue report of — for 1892–93, communicated to the Chief Engineer for Irrigation.	4th do. do. No. 505 I.	23rd Feb. 1893, No. 184 I.
Irrigation works in Sindh.—Government of India review of the revenue report of — for 1892–93, communicated to the Chief Engineer for Irrigation.	4th do. do. No. 506 I.	30th June 1893, No. 576 I.
Minor Irrigation work in Kurnool.—Board's Proceedings sanctioning an allotment of funds for the execution of a —, recorded.	4th do. do. No. 508 I.	......
Land.—Notification for the acquisition of — required for extending field channels from Anikepalli tank to irrigate Pembarti fields, Nellore district, ordered to be published in the *Fort St. George Gazette.*	7th do. do. No. 511 I.	......

Subjects.	Number and Date of Order.	Numbers and Dates of previous Orders.
Land.—Notification for the acquisition of — required for the leading channel from Kodavalur tank-bed to Talamanchi minor channel, Nellore district, ordered to be published in the *Fort St. George Gazette.*	7th July 1894, No. 512 I.	......
Land.—Notification for the acquisition of — required for the Suravapalli canal left bank, Nellore district, ordered to be published in the *Fort St. George Gazette.*	10th do. do. No. 514 I.	......
Land.—Notification for the acquisition of — required for the Eastern channel, Nellore district, ordered to be published in the *Fort St. George Gazette.*	10th do. do. No. 515 I.	......
Land.—Notification for the acquisition of — required for the right side channel of Motur channel, Kistna delta system, ordered to be published in the *Fort St. George Gazette.*	10th do. do. No. 516 I.	.....
Land.—Notification for the acquisition of — required for the Medur channel, Kistna delta system, ordered to be published in the *Fort St. George Gazette.*	10th do. do. No. 517 I.	17th Oct 1892, No. 856 I.
Land.—Notification for the acquisition of — required for distributary channel in Chennur and Dugganapalli, Cuddapah district, ordered to be published in the *Fort St. George Gazette.*	10th do. do. No. 518 I.	......
Water-rate on lands irrigated from a private tank.—The attention of the Board of Revenue (Revenue Settlement) invited to G.O., No. 390 I., dated 11th May 1894 with reference to the levy of — near Yeddapalli village, Ellore taluk, Gódávari district.	11th do. do. No. 522 I.	11th May 1894, No. 390 I. 8th May 1893, No. 417 I. 14th Aug. 1891, No. 626 I.
Land.—The Special Deputy Collector, Rushikulya Project, directed to procure the occupation and use of certain — for the Ichchhápuram channel for period not exceeding three years from date of occupation.	12th do. do. No. 523 I.	......
Land.—Notification for the acquisition of — required for the Veeranam tank-bed, South Arcot district, ordered to be published in the *Fort St. George Gazette.*	13th do. do. No. 525 I.	6th Nov. 1893, No. 960 I.
Special Deputy Collector, Rushikulya Project.—Letter from Collector of Ganjám requesting sanction to the retention of the — up to 31st December 1894, recorded.	13th do. do. No. 526 I.	......
Kurnool-Cuddapah Canal.—Proceedings, Revenue Department, in regard to the grant of free passes for leaf manure to ryots holding wet lands under the — as an experimental measure, communicated to Superintending Engineer, III Circle.	19th do. do. No. 532 I.	26th June 1894, No. 488 I. 4th Dec. 1893, No. 1059 I.
Canal Plantation Report.—Letter from the Government of the North-Western Provinces and Oudh forwarding copies of their — for year ending 31st March 1893, communicated to the Chief Engineer for Irrigation.	19th do. do. No. 533 I.	19th Sept. 1893, No. 802 I. 6th Oct. 1892, No. 824 I.

Subjects.	Number and Date of Order.	Numbers and Dates of previous Orders.
Eden canal.—Letter from the Government of Bengal forwarding copy of selections from their Irrigation Department records from 1865 to 1893 regarding the —, communicated to the Chief Engineer for Irrigation.	25th July 1894, No. 539 I.	......
Reply to Government of Bengal	25th do. do. No. 540 I.	......
Land.—The Deputy Collector, Narsapur, Gódávari district, directed to procure the use and occupation, for a period not exceeding three years, of certain — required for constructing dams to certain channels.	25th do. do. No. 541 I.	......
Land.—The Sub-Collector, Gódávari district, directed to procure the use and occupation of certain — required for irrigation purposes for a period not exceeding three years from date of occupation.	25th do. do. No. 542 I.	......
Land.—Notifications for acquisition of — required in connection with the extension of certain canals under the Kistna delta system, ordered to be published in the *Fort St. George Gazette.*	25th do. do. No. 543 I.	11th April 1893, No. 318 I. 4th July 1893, No. 587 I. 4th Nov. 1884, No. 992 I.
Land.—Notification for acquisition of — required for closing a breach in the right bank of the Vottigedda, Palkonda taluk, Vizagapatam district, ordered to be published in the *Fort St. George Gazette.*	25th do. do No. 544 I.	......
Sangam anicut system.—The balance of the reserve for unforeseen works of the — increased from Rs. 1,414 to Rs. 1,705.	25th do. do. No. 545 I.	11th May 1894, No. 384 I. 2nd May 1894, No. 367 I.
Periyár and Madura divisions.—E Form Progress Reports of — for June 1894, ordered to be forwarded to the Government of India.	25th do. do. No. 546 I.	22nd June 1894, Nos. 472-73 I.
Forwarded	25th do. do No. 547 I.	......
Objectionable items statement.—Orders on Supplemental — for March 1894 for No. I Periyár division.	25th do. do. No. 549 I.	......
The above transmitted to the Examiner through the Superintendent of Works.	25th do. do. No. 550 I.	......
Objectionable items statement.—Orders on — for No. I Periyár division for April 1894.	27th do. do. No. 556 I.	14th June 1894, Nos. 450-51 I. 29th June 1894, Nos. 499-500 I.
The above transmitted to the Examiner through the Superintendent of Works.	27th do. do. No. 557 I.	......
Objectionable items statement.—Orders on Supplemental — for March 1894 for the V Circle.	31st do. do. No. 563 I.	......